THE DOCK & HARBOUR AUTHORITY

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Editorial

The Port of Gloucester.

The Port of Gloucester, which is connected with the River Severn by means of the Gloucester Ship Canal, first came into prominence in the year 1827, but it was not until 1874 that vessels of any size were able to reach Gloucester. It was in this year that the Sharpness Docks were constructed at the seaward end of the Ship Canal some 16 miles below Gloucester.

The Port of Gloucester comprises two sets of docks, one known as the Sharpness Docks and the other the Gloucester Docks.

The Ocean Dock at Sharpness can accommodate vessels up to 9,000 tons capacity, the dock entrance consisting of a tidal basin and lock, which together are 900-ft. long, the lock having a minimum width of 57-ft. Sharpness docks have a water area of 20 acres, and the quayage and wharfage extend to 5,600-ft. The facilities available for shipping consist of two floating pneumatic elevators which can discharge 230 tons of grain per hour, cranes with a lifting capacity of up to 30 tons, and a large number of steel winches.

There is also available an hydraulic coal tip and a graving dock.

The Gloucester Docks, which are 16½ miles distant from the Sharpness Docks, were opened in 1827 and were subsequently enlarged in 1849 and 1892. These docks have a total water area of 14 acres and have over 10,000-ft. of quayage available for shipping.

The principal commodities that are dealt with at the Port of Gloucester are grain, flour, timber, petroleum oils, coal and salt, and during the past year about 500,000 tons of goods were handled.

The Port of Gloucester forms the supplement for this month's issue and an illustrated article appears on another page.

Tyne Improvement Commission: New Coal Staith Opened at Howdon.

The Tyne Improvement Commissioners, following their usual progressive policy, have recently completed the construction of a new coal shipping staith at Howdon, and this was officially opened by the Chairman, Mr. H. P. Everett, J.P., on Friday, December 16th.

The new staith is the most up-to-date plant of its kind and has been constructed to fulfil the need for quicker and more efficient loading of coal into vessels, and there is no doubt that it should ultimately assist to a great extent in increasing the coal exports from the Tyne.

The site of the staith is on the north bank of the river, near the west or up-river end of Northumberland Dock, about three-and-a-half miles from the harbour entrance, and comprises two berths for large vessels.

The plant consists of two travelling shipping towers, with provision for a future third tower, fed by belt conveyors from the wagon discharging hoppers, which are situated at the riverward end of the standage sidings. The wagons travel by gravity to the discharging point and also gravitate away from this point to the empty sidings. Accommodation has been made in the sidings for 3,680 tons of coal in 20-ton wagons, with a future possible extension to about 5,440 tons, while empty standage is provided for 90 wagons, with a possible extension to about 120 wagons.

The coal is carried from the wagon discharging hoppers to the vessels being loaded, on rubber and canvas belt conveyors 42 inches wide, the length of two of the conveyors being as much as 630-ft. from the wagon discharging hopper to the pivot of the west shipping plant. Each shipper with its associated conveyors is capable of loading 500 tons of coal per hour at a belt speed of 350-ft. per minute. The shippers are pivoted at their landward end, but have a radial travel of about 90-ft. at their riverward end, thus being able to command, say, two hatches in a vessel alongside without movement of the vessel. Coal can be loaded at a maximum height of 61-ft. above h.w.o.s.t., and at a maximum distance of 55-ft. beyond the edge of the quay, or, if necessary, into a small craft close alongside the quay. In designing the staith, all possible precautions have been taken to prevent breakage. In addition, power-driven anti-breakers of the Handcock type are provided at each loading tower for lowering the coal into the holds of vessels.

The whole plant is electrically operated and all under the control of the driver at each shipping point situated in the cabin high up on the riverside of each tower, from which he can look into the hold of the ship being loaded.

It has been arranged that the conveyor belts can only be started up and stopped in the correct sequence, and limit switches have been fixed to prevent any over-travelling of any portion of the plant.

The shippers each weigh about 180 tons and, owing to a good foundation only being found at a depth of about 100-ft. below high water, this weight had to be transmitted to this foundation by means of steel cylinders sunk under compressed air and afterwards filled with reinforced concrete.

The shipping plant is well protected from ship damage by means of fendering carried on timber piles, and timber gangways are provided for access to the various mooring dolphins.

The present dredged depth of water alongside the staith is 25-ft. at l.w.o.s.t., and a tier of moorings 480-ft. in length has been provided for waiting ships, which can be put into position alongside the staith at any state of the tide.

The complete cost of this undertaking was £120,000, and though in these times of trade depression it may seem a bold policy on the part of the Tyne Improvement Commissioners, they are to be congratulated upon their enterprise.

The new staith has added considerably to the facilities available on the Tyne and should reward the Commissioners through an increased turnover in coal exports.

The Port of Verdon, France.

Bordeaux, the principal port in the south-west of France, is situated on the left bank of the River Garonne, a distance of 100 kilometres from the sea, and in order to avoid the long distance to be traversed by passengers bound for Bordeaux, it was decided to build an advance port at the sea entrance in much the same manner as Cuxhaven acts as an advance port for Hamburg.

Consideration to this new port was first given in 1910, and it was decided that it should be erected at Verdon and should comprise a pier with deep water on both sides, together with a martime passenger station.

The project was abandoned during the war and revived again in 1918, though construction of the new pier was not begun until some years later, when it was finally decided to build a pier 317.50 metres in length and 38 metres in width connected with the land by a curved viaduct for approach, which is 372 metres long. The situation decided on was about 4 kilometres from the point which separates the estuary from the sea, so as to give adequate protection to the pier in time of rough weather.

An illustrated article on this project appears on another page.

Improvements at Galway.

The Galway Harbour Commissioners have a scheme in hand for an improvement to the docks in the Port of Galway.

The plans which have been drawn up provide for an extension of one of the piers for a distance of 350-ft.; the linking up of the two existing docks; the general deepening of the entrance to the dock by means of excavating in front of the dock, and also the dredging of the outer channel. When these improvements, which are estimated to cost £336,000, are completed, vessels with a draught of from 20-ft. to 25-ft. will be able to enter the port. It will also enable the tender services of the trans-Atlantic liners to operate at all states of the tide, both night and day.

Aden Port Trust.

The following are the returns for the month of October, 1932, of shipping using the port:—

	No.	Tonnage
Merchant Vessels over 200 tons ...	122	537,365
,, ,, under 200 tons ...	3	486
Government Vessels	9	7,683
Dhows	113	2,795
PERIM.		
Merchant Vessels over 200 tons ...	10	16,374

The total value of imports excluding Government stores was Rs.43,77,000, as compared with Rs.43,80,000 for October, 1931, and of exports Rs.31,83,000, as compared with Rs.35,84,000.

The total value of both imports and exports together was Rs.75,60,000, as compared with Rs.79,64,000.

Imports during the month were above those for October, 1931, in the case of coffee, grain, pulse and flour, hardware, hides (raw), seeds, skins (raw), sugar, piece goods (white and printed or dyed), twist and yarn, and tobacco (unmanufactured); and below in the case of gums and resins, piece goods (grey), tobacco (manufactured) and treasure (private).

TRADE OF THE PORT.

Article.	Unit	Imports.		Exports.	
		Quantity.	Value Rs.	Quantity.	Value Rs.
Coal	Tons	5,505	1,33,339	0	0
Coffee	Cwts.	8,663	2,82,794	9,796	4,52,542
Grain, Pulse and Flour	,,	45,981	2,50,336	18,848	95,319
Gums and Resins	,,	418	8,320	1,155	19,889
Hardware	—	0	17,748	0	18,665
Hides, raw	No.	1,945	1,029	3,185	3,719
Oil, Fuel	Tons	39,190	9,79,750	0	0
,, Kerosene	Gls.	16	12	4,284	3,324
,, Petrol	,,	3,227	4,034	16	19
Salt	Tons	0	0	21,600	2,58,800
Seeds	Cwts.	6,414	50,642	1,909	18,635
Skins, raw	No.	389,255	1,79,616	419,453	2,42,423
Sugar	Cwts.	22,566	1,45,231	16,349	1,04,162
Textiles—					
Piece Goods, Grey	Yds.	3,816,250	5,67,464	3,733,960	5,30,594
,, ,, White	,,	630,634	1,18,589	300,820	57,916
,, ,, Printed or Dyed ...	,,	1,089,270	2,08,346	1,117,304	2,53,940
Twist and Yarn	Lbs.	260,260	1,28,470	174,096	85,016
Tobacco, Unmanufactured	,,	1,114,204	1,75,139	718,088	1,08,991
,, Manufactured	,,	31,304	33,674	36,456	35,416
Other Articles	No. of Pkges.	57,047	9,21,413	23,433	4,15,319
Treasure, Private	—	0	1,71,317	0	4,78,635
Total ...	—	—	43,77,263	—	31,83,324

The number of merchant vessels over 200 tons that used the port in October, 1932, was 122, as compared with 111 in the corresponding month last year, and the total tonnage was 537,000, as compared with 478,000.

Excluding coal, salt, fuel oil and military and naval stores and transhipment cargo, the total tonnage of imports in the month was 9,200 and of exports 5,400, as compared with 9,300 and 5,200 respectively for the corresponding month last year.

Exports were above those for October, 1931, in the case of coffee, hardware, seeds, skins (raw), sugar, piece goods (white and printed or dyed), twist and yarn, tobacco (unmanufactured); and below in the case of grain, pulse and flour, gums and resins, hides (raw), piece goods (grey), tobacco (manufactured) and treasure (private).

Port of Southampton Topics

A Disappointing Year of Trade.

WHILE it is not yet possible to analyse completely Southampton's trade during 1932, for the reason that the December figures are not available until the middle of the month, there is no doubt that the year has been a most disappointing one from almost every aspect; but while trade has decreased in every department at the docks compared with the previous year, there is one bright side to the rather depressing picture. There has been no diminution in the work on the big docks extension scheme, and remarkable progress has been made. Such faith in the future of Southampton and its ability, not only to maintain the standards already achieved, but to extend, is very cheering in these days of depression, and there is every reason to believe that the Southern Railway's enterprise will meet with the reward it merits.

The extensions on the Western Shore, the first part of the scheme, were unofficially opened on December 21st, when the White Star liner "Homeric," the largest twin-screw vessel in the world, sailed from the new quay on a pleasure cruise.

The "Homeric" thus had the distinction of being the first big vessel to sail from the new berths.

Nearly six years have passed since the scheme was begun on this section. In that time the whole aspect of the Western Shore has been changed. Mud land has given place to over 100 acres of firm land, upon which sheds and other buildings have been erected. Three thousand seven hundred feet of completed deep water quay wall stand as a monument to the engineers, and beyond the finished berths there extends a line of 68 monoliths, which are being sunk into the river bed. When all have reached their final level and the cope work has been added, Southampton will have 7,000-ft. of the finest deep water accommodation in the world, and will possess unrivalled docking facilities for the biggest ships afloat or contemplated.

In considering the dock figures for 1932 it is only possible at this stage to analyse the statistics for eleven months of the year, and, comparing them with the returns for the first eleven months of 1931, it is seen that nearly 400 fewer ships visited the port up to November 30th.

In the first eleven months of 1932 the number of vessels inward was 2,910 and the number outward the same. In the corresponding period of last year the totals were 3,295 and 3,301.

This big drop has obviously had a big effect on the other returns. For instance, gross tonnage dropped from 15,300,210 tons to 13,471,836 inward and from 15,268,504 tons to 13,408,087 tons outward, involving decreases of well over 1¾ million tons in both cases.

Cargo decreased by a very large amount, and the export trade showed the greater falling off. The amount of imports fell from 536,089 tons to 499,551 tons, a drop of 36,538 tons, while export cargo slumped from 350,007 tons to 296,087 tons, a decrease of 53,920 tons.

In view of the prevailing conditions, a falling off in the number of passengers travelling was not unexpected. There were nearly 32,000 fewer passing through the port than in the corresponding eleven months of 1931. The number of inward bound passengers fell from 243,952 to 232,046, and the number of outward bound passengers from 243,742 to 223,393. Whereas in 1931 the number of passengers inward and outward were roughly similar, this year the number of people coming into the country through the port has very much exceeded the number leaving.

The number of inward bound troops through the port, 19,888, provided the only increase over last year's figures in the whole set of statistics.

Any mention of the year's activities at Southampton would be incomplete without reference to pleasure cruising. Throughout the summer and autumn a large number of the large ships of the British lines have carried out pleasure cruises from Southampton, and without the inclusion of these figures in the year's statistics the comparisons with the 1931 figures would have been much more unfavourable.

The Port of New York

Latest Data issued by the Bureau of Commerce

Value of Foreign Trade at the Port of New York.

THE value of foreign trade at the Port of New York during the month of September, 1932, was $85,977,000, representing a decline of 47 per cent. from the September, 1931, figure of $162,608,000. Exports were 45 per cent. and imports 48 per cent. less than last year.

	September 1932 $	September 1931 $	Net Change Amount $	Net Change Per Cent.
Exports	36,989,000	67,738,000	—30,749,000	—45.4
Imports	48,988,000	94,870,000	—45,882,000	—48.4
Exports and Imports	85,977,000	162,608,000	—76,631,000	—47.1

Foreign trade values for nine months, January to September, compared with the same period in 1931 was as follows:—

	January-September 1932 $	January-September 1931 $	Net Change Amount $	Net Change Per Cent.
Exports	360,678,000	695,440,000	—334,762,000	—48.1
Imports	497,046,000	795,204,000	—298,158,000	—37.5
Exports and Imports	857,724,000	1,490,644,000	—632,920,000	—42.5

Receipts of Grain and Visible Supply at the Port of New York.

Although deliveries of grain at the Port of New York in October, 1932, were almost a million and a-half bushels more than in the previous month, the volume was 52 per cent. less than in October, 1931. Receipts of domestic and Canadian grain were 3,851,915 bushels, as compared with 8,014,131 bushels last year. Railroad deliveries amounted to 166,400 bushels, and 3,685,515 bushels were received *via* the canal.

Receipts (Bushels).

	October 1932	October 1931	Net Change Amount	Net Change Per Cent.
All Grain	3,851,915	8,014,131	—4,162,216	—51.9
Wheat	3,356,704	7,657,477	—4,300,773	—56.1
Barley	—	—	—	—
Corn	201,699	68,679	+133,020	+194.5
Oats	286,712	277,775	+8,937	+3.2
Rye	6,800	10,200	—3,400	—33.2

For ten months, January to October, the volume delivered in the port was 31,966,476 bushels, as compared with 54,978,473 bushels in the same period in 1931, a difference of 42 per cent.

Receipts (Bushels).

	January—October 1932	January—October 1931	Net Change Amount	Net Change Per Cent.
All Grain	31,966,476	54,978,473	—23,011,997	—41.8
Wheat	27,001,375	48,379,827	—21,378,452	—44.2
All Other	4,965,101	6,598,646	—1,633,545	—24.7

The volume delivered by vessel *via* the canal in the above period was 20,234,111 bushels, 39 per cent. less than last year's figure of 33,292,773, while receipts by railroad dropped 46 per cent. from 21,679,700 bushels a year ago to 11,729,100 for the period this year.

The visible supply of grain in the port, both in elevators and afloat on October 29th, 1932, was 3,473,000 bushels, 41 per cent. less than the supply on October 31st, 1931, the nearest comparable date.

Visible Supply (Bushels).

	October 29 1932	October 31 1931	Net Change Amount	Net Change Per Cent.
All Grain	3,473,000	5,875,000	—2,402,000	—40.9
Wheat	3,065,000	5,768,000	—2,703,000	—46.9
Barley	3,000	5,000	—2,000	—40.0
Corn	30,000	1,000	+29,000	+2,900.0
Oats	27,000	66,000	—39,000	—59.1
Rye	348,000	35,000	+313,000	+894.3

Grain Exports.

The volume of grain exported from the Port of New York during the month of September, 1932, was 2,103,000 bushels, 68 per cent. less than the September, 1931, figure of 6,567,000 bushels. Exports of domestic grain fell off 55 per cent., which was the first decrease registered for any month as compared with a similar period in the previous year, since August, 1931. The volume of Canadian grain in transit continues to decline.

	September 1932 Bushels	September 1931 Bushels	Net Change Amount Bushels	Net Change Per Cent.
Domestic and Canadian Grain	2,103,000	6,567,000	—4,464,000	—68.0
Domestic Grain	570,000	1,257,000	—687,000	—54.7
Canadian Grain	1,533,000	5,310,000	—3,777,000	—71.1

The volume of grain exports during the first nine months of the year was 32,324,000 bushels, 33 per cent. less than was exported in the corresponding period in 1931.

	January-September 1932 Bushels	January-September 1931 Bushels	Net Change Amount Bushels	Net Change Per Cent.
Domestic and Canadian Grain	32,324,000	48,492,000	—16,168,000	—33.3
Domestic Grain	11,047,000	4,692,000	+6,355,000	+135.4
Canadian Grain	21,277,000	43,800,000	—22,523,000	—51.4

Analysis of the exports of wheat from the Port of New York shows this year that 96 per cent. was shipped to European countries, and that the greater portion of this is taken by four countries, namely, France, United Kingdom, Belgium and Germany. These four countries received 75 per cent. of all the wheat exported from New York since January.

Vessel Movements in Foreign Trade.

Vessel entrances and clearances in foreign trade at the Port of New York continue to be below the number recorded last year. Entrances in October, 1932, were 16 per cent. lower than in that month in 1931, and clearances were 22 per cent. lower.

	October 1932	October 1931	Net Change Amount	Net Change Per Cent.
Entrances, No. of Vessels ...	399	476	—77	—16.2
Clearances, No. of Vessels ...	399	513	—114	—22.2
Entrances, Net. Reg. Tonnage	2,024,409	2,361,413	—337,004	—14.3
Clearances, Net. Reg. Tonnage	1,999,854	2,525,037	—525,183	—20.8

The entrances included 22 vessels in ballast and 377 with cargo, while of the clearances 60 were in ballast and 339 were with cargo. The ratio between vessels in ballast and with cargo showed an improvement in October, 1932, over the same period last year. For this month the percentage of vessels in ballast was 10 per cent. as compared with 13 per cent. in October, 1931.

For ten months of the year, January to October, entrances and clearances were as follows:—

	January-October 1932	January-October 1931	Net Change Amount	Net Change Per Cent.
Entrances, No. of Vessels ...	4,381	5,012	—631	—12.6
Clearances, No. of Vessels ...	4,480	5,202	—722	—13.9
Entrances, Net. Reg. Tonnage	23,021,357	25,160,840	—2,139,483	—8.5
Clearances, Net. Reg. Tonnage	23,096,717	25,585,467	—2,488,750	—9.7

Commerce at Port Newark.

The water-borne receipts at Port Newark, which is a part of the Port of New York, during October, 1932, amounted to 26,280 tons, 11 per cent. less than the October, 1931, figure of 29,551 tons. The receipts of lumber by vessel decreased from 14,165,000 board feet in October last year to 7,032,000 feet in that month this year, a falling off of 50 per cent. There was a considerable increase in receipts by vessel of cargo other than lumber, the month's tonnage being 15,732 as compared with 8,304 tons in October, 1931, a gain of 90 per cent. Twenty-nine steamers arrived at Port Newark during the month as compared with 21 in the same month last year.

Inland shipments of lumber out of Port Newark amounted to 14,937,000 board feet, of which 6,125,000 feet moved by railroad, and 8,812,000 feet moved by truck.

The volume of receipts by vessel during the present year, up to and including October, compared with the same period in 1931, was as follows:—

Water-borne Receipts at Port Newark.

	January—October 1932	January—October 1931	Net Change Amount	Net Change Per Cent.
All Commodities (tons)	301,304	428,647	—124,343	—29.0
Lumber (board feet) ...	89,363,000	162,460,000	—73,097,000	—45.0
Other Commodities ...	170,410	184,958	—14,548	—7.9

Steamship Passenger Traffic.

During the months of August and September, New York furnished concrete evidence of its supremacy as the leading world port for overseas passenger traffic.

Almost a quarter million people sailed abroad or arrived here from foreign countries during those months, and 75 per cent. of them were citizens of the United States. Certainly, there has been a steady growth since the world war in the number of citizens that have developed the desire for overseas travel. Undoubtedly the many short cruises to nearby Canadian and West

The Port of New York—continued

Indian waters has had a lot to do with cultivating the increasing public taste for travel in foreign lands.

	August		September	
INBOUND—	1932	1931	1932	1931
Aliens, Immigrant ...	1,495	2,253	1,701	3,008
Aliens, Non-Immigrant	9,887	11,465	16,754	16,079
U.S. Citizens	43,550	46,431	51,505	54,656
Total ...	54,932	60,149	69,960	73,743
OUTBOUND—				
Aliens, Emigrant ...	4,681	6,196	6,257	4,920
Aliens, Non-Emigrant	14,472	18,669	12,907	14,352
U.S. Citizens	45,055	55,373	30,693	33,589
Total ...	64,208	80,238	49,857	52,861
Total Inbound & Outbound	119,140	140,387	119,817	126,604
Total since January 1st ...	496,525	562,820	616,342	689,424

While 616,342 people were bent on foreign travel *via* this port, 732,574 more sailed from here or arrived during the nine months ending September 30th on those vessels in the intercoastal, coastal, Long Island Sound and Hudson River service plying from New York. This latter figure does not include the thousands of one-day excursionists who sail up the Hudson River and Long Island Sound to nearby points.

In comparison with 1931, the total of 1,348,916 domestic and foreign travellers reported up to the end of September is approximately 17 per cent. under the 1931 total of 1,621,405 for the same period.

Steamship Sailings.

The number of sailings from the Port of New York for October shows very little change from the month previous and no indication of any up-swing in the shipping industry. This season's sailings are still running about 20 per cent. under that of last year, notably those to the United Kingdom and Northern Europe.

However, a grand total of 1,205 sailings was reported for the month of October, of which 311 were direct from New York to foreign ports, 26 to the Pacific coast and 136 in coastal service.

The peak day of the month was Saturday, October 29th, with a total of 70 departures. Almost half of this number, or 36 to be exact, were to foreign destinations, including 4 to the United Kingdom, 2 to Northern European ports, 3 to Italy and the Mediterranean, 1 each to South Africa, Australia, and the Canadian Atlantic provinces, 12 to the West Indies and Mexico, 2 to South America, 3 to the Far East, 1 foreign cruise and 1 tanker to a foreign oil port.

The 34 sailings in domestic service included 4 to the Pacific Coast, 7 to South Atlantic and Gulf ports, 3 coastal tankers and 3 coal carriers.

Notes of the Month.

Bombay Port Trust.

At a meeting of the Trustees of the Port of Bombay held on November 15th, 1932, the following were the main items of business disposed of:—

A contract for the supply during 1933 of 23,000 gallons petrol was placed with the Indo-Burma Petroleum Co., Ltd.

Sanction was accorded to a revised estimate amounting to Rs.17,443 for renewing the flooring of the East gallery of " K " Shed, Prince's Dock.

The following lease proposals were sanctioned:

(1) A 99-year lease of Plot No. 37 (area about 763 sq. yds.) on the Apollo Reclamation (old Cotton Green) for a first-class residence with shops on the ground floor.

(2) A 15-year lease of a plot of land (area about 4,666 sq. yds.) at Wadala for iron smelting and rolling mills.

(3) A 10-year renewal of leasehold Rent Roll No. 1021 (area about 991 sq. yds.) at the junction of Kurla Street and Argyle Road, Elphinstone Estate, for shops, godowns and residences.

Increased Grain Elevator Capacity at Vancouver.

The United Grain Growers, Ltd., have now completed the one million bushel extension to their grain elevator at Burrard Inlet, Vancouver, the capacity now reaching 2,650,000 bushels.

The Company now owns about 500 elevators throughout the three Prairie Provinces and in North-Eastern British Columbia, and also has terminal elevators at Port Arthur, Ontario, as well as at Vancouver.

Weser River Shipping in October, 1932.

Water conditions on the Weser in October could only be maintained at a level permitting the minimum draft depth of one metre from Hanover-Munden through supplies from the Eder reservoir, until the 13th October. It is only by using this reservoir that the Upper Weser has been navigable for the last four months. On the Middle Weser the position has been almost the same.

Goods traffic through the Bremen Weser Lock in October at 131,900 tons in both directions was 11,900 tons, or 9 per cent. greater than in the previous month, but still 20,200 tons or 13 per cent. less than in October, 1931. Down-stream, 105,200 tons, or 8,500 tons, equal to 8 per cent., more were shipped than in September. Against an increase in coal transport by 17,000 tons is a decrease in salt and potash of 6,500 tons. Up-stream traffic, at 26,700 tons, had an increase of 3,400 tons, or 15 per cent., due to larger grain and piece goods transport. During the months January-October, 1932, altogether 1,096,000 tons were carried, against 1,338,800 tons in the same period of 1931. The decline of 242,700 tons, or 18 per cent., fell solely to down-stream traffic which, with 797,000 tons (minus 253,000 tons) amounted to only three-quarters of the quantity carried in the previous year, chiefly through losses in coal (103,000 tons, equal to 19 per cent.), gravel and stones (64,000 tons, equal to 39 per cent.), as well as potash and salt (66,000 tons, equal to 32 per cent.). Up-stream traffic, with 299,100 tons, showed an increase of 11,200 tons, or 4 per cent., chiefly as a result of larger shipments of grain in the second half of the year.

The result of the current year compared with 1931 has been further influenced by the smaller October figures, for up to the end of September there was a decrease down-stream of 19 per cent. and up-stream an increase of 7 per cent.

Canada: Enquiry for Ship's Tackle Blocks.

The Officer-in-Charge of H.M. Trade Commissioner's Office at Winnipeg reports that a local firm desire to receive quotations from United Kingdom manufacturers of steel tackle blocks for manilla rope with loose hooks and wooden tackle blocks strapped with iron. Further details have been communicated by the Department to firms whose names are entered on its " Special Register."

Firms desirous of offering tackle blocks of United Kingdom manufacture can obtain the further details of this enquiry, together with particulars of the " Special Register " service of information, upon application to the Department of Overseas Trade, 35, Old Queen Street, London, S.W.1. Reference number G.X. 12156 should be quoted.

Messrs. Ferguson Bros. (Port Glasgow), Ltd.

Messrs. Ferguson Bros. (Port Glasgow), Ltd., have launched the following tonnage during the year 1932:—

Type of Vessel	Name	Gross Tonnage	I.H.P.	Owners
Bucket Dredger ...	"Tilbury II"	242	450	The Port of London Authority
Dredging Plant ...	—	150	—	British and Colonial Owners
Dredging Machinery	—	—	350	British and Colonial Owners
		392	800	

Messrs. Sulzer Bros. (London), Ltd.

In order to meet the demand for British machinery, Messrs. Sulzer Bros. (London), Ltd., of 31, Bedford Square, London, W.C.1, have entered into an agreement with Messrs. Sir W. G. Armstrong Whitworth and Co. (Engineers), Ltd., to manufacture certain of their specialities exclusively for them at the Scotswood Works, Newcastle-upon-Tyne.

The works of Sir W. G. Armstrong Whitworth are well equipped, and they are already thoroughly acquainted with Sulzer designs and production methods, having manufactured Sulzer Diesel marine engines under licence for over 12 years, and they also hold a licence to build Sulzer Traction Diesel Engines.

Centrifugal pumps, diesel engines, refrigerating plant, etc., will be manufactured from drawings supplied by Messrs. Sulzer Bros., Ltd., of Winterthur, and all the advantages of the accumulated experience of the latter firm will be available. Quality and workmanship will also be of the same high standard, as the production will be under the immediate supervision of inspectors trained at the Winterthur Works.

This arrangement, however, will not preclude Sulzer Bros. from supplying machinery manufactured in Switzerland as hitherto, but this arrangement will now enable them to supply British-built plant as well.

Italian Harbour Affairs

THE Consorzio Autonomo del Porto di Genova has held its annual general meeting, and according to the report it appears that receipts reached, during 1932, 45,717,000 lire, against 57,826,000 lire during the corresponding period of 1931. This decline is due to the depression in traffic, but the policy of the Consorzio Autonomo del Porto to reduce charges as a whole in order to increase trade in the Port of Genoa has influenced the final results of the accounts.

An allowance of 108 million lire had been made by the Italian Government, to be distributed over a period of five years, to complete the Mussolini Docks, which are under construction, west from the present Port of Genoa, and other works under execution, such as the extension of the drydock, the cutting of the head of the Molo Vecchio, the transformation of the Andrea Doria Pier, and the construction of the new maritime passenger railway station connected with the Ponte dei Mille.

The construction of the Mussolini Docks includes three piers of 400 metres in length and 150 metres in breadth. These piers are to be 150 metres apart from each other. The present seaplane station will be transferred further west, it having been ascertained that it considerably hinders the regular course of navigation, pending the construction of a special dock for the airway services. Two of the piers of the Mussolini Docks are practically completed, while during the first half of 1933 Sampierdarena will be sheltered by harbour facilities. The work on cutting the head of the Molo Vecchio and the construction of the maritime passenger station on the Andrea Doria Pier rendered necessary after the commissioning of the "Rex" and the "Conte di Savoia" is proceeding satisfactorily.

During the first eleven months of 1932 shipping at Genoa has shown a decline of 11.40 per cent. in respect to the corresponding period of 1931, due to the general economic depression, as the position in other ports of the world is no different. As a matter of fact, during the first eleven months of 1932 shipping at Marseilles has shown a decline of 11.54 per cent., at Antwerp a decline of 17.61 per cent., and at Rouen of 13.27 per cent. On the other hand, it should be noted that the decline of shipping at Genoa is due also to the smaller imports of coal and cereals, which represented, until some years ago, the most important factors in Genoese shipping. During the period from January 1st to November 30th, 1932, the imports of coal at Genoa have shown a decline of 15.15 per cent., and the imports of cereals a decline of 31.32 per cent. in respect to the corresponding period of 1931. It should be noted that while the smaller arrivals of cereals are due to the satisfactory results of the Italian crop, the smaller arrivals of coal are due to the decreased requirements of fuel by the Italian State Railways Administration. The exports of goods through the Port of Genoa have shown, during the period under review, an increase of 9.24 per cent., which fact is of considerable importance, especially if one considers the general economic crisis. At present traffic through the Port of Genoa represents about 22 per cent. of the whole Italian shipping. Concessions had been made to assist shipping, particularly in the cutting of charges for the use of electric elevators for the unloading of coal.

According to the statistics of shipping in the Port of Genoa during the first eleven months of 1932, these included the arrival and clearance of 8,859 ships representing 17,769,000 n.r.t., against 9,083 ships and 18,506,000 n.r.t. during the period from January to November, 1931. Passengers arrived and cleared at Genoa during the period under review reached 119,692, against 133,534 during the corresponding period of 1931, while goods traffic included 5,511,000 tons, against 5,768,000 tons. The new floating coal bunkering store in the Port of Genoa has started operations, and this should have a favourable influence on the development of shipping at the port.

No less interesting has been the development of the Port of Naples during 1932, due particularly to the increased activity of foreign vessels with the creation of new services to North and South America, and to regions beyond the Suez Canal. Towage services, storage facilities, etc., have considerably improved, and during the first twenty days of December about 30 large liners, among them the "Conte di Savoia" and the "Empress of Britain," have called at Naples.

Among the works completed in the Port of Naples during 1932 may be mentioned the following: (a) Breakwater sheltering the entrance to the port, which cost 47,000,000 lire; (b) the extension of the outer breakwater to shelter the Granili Docks, at a cost of 34,000,000 lire; and (c) the construction of a temporary maritime passenger station on the Beverello Mole. With the construction of the above-mentioned works the greatest part of the harbour improvements projected by the Government are nearly completed. It now remains to build the maritime passenger station on the Molo Angioino, to build the large drydock, and to complete the fitting out of the quayage of the Littorio Docks, the construction of which has been completed.

While the construction of the station has already been described, it may be interesting to note that a credit of 20 million lire has already been allotted for the construction of the drydock, the project for which has already been approved by the Supreme Board of the Ministry of Public Works. The new drydock is to be placed in the Cesario Console Pier district and is to be provided with a double entrance in order to enable liners to enter both from the outer harbour and from the Marinella Dock. The total length of the drydock is to be 321 metres and the breadth 40 metres. The drydock will be constructed so that it may be divided into two sections, one measuring 200 metres and the other 121 metres. Subsequently the drydock could be lengthened to 400 metres if the condition of shipping renders it necessary.

According to statistics which have been published by the Consiglio Provinciale dell 'Economia at Trieste (Chamber of Commerce and Industry), the following is a schedule of shipping at that port during the first eleven months of 1932, and shows a general decrease:—

	1932	1931
	Centals	
ARRIVALS		
By Rail	4,678,303	7,003,630
By Sea	14,745,760	16,311,583
Total	19,424,063	23,315,213
CLEARANCES		
By Rail	7,620,479	10,438,844
By Sea	4,434,201	5,567,572
Total	12,054,680	16,006,416
TOTAL		
By Rail	12,298,782	17,442,474
By Sea	19,179,961	21,879,155
Total	31,478,743	39,321,629

Port of London Notes

Tilbury Passenger Landing Stage.

Twenty-two vessels totalling 218,229 gross registered tons used the Tilbury passenger landing stage during the month of November. Altogether 2,213 passengers were embarked or disembarked at the stage, in addition to baggage and mails.

Increase in Coasting Traffic.

The returns for the Port of London show a distinct increase this year in coasting traffic both in respect of tonnage of ships and goods carried. For the first nine months the tonnage of coasting vessels that used the port increased by over half-a-million tons compared with the similar period of 1931. During the same period coasting vessels brought into the port some 500,000 tons more goods, over 6 per cent., and carried from the port nearly 40,000 tons more goods, about 3 per cent., than during the first nine months of 1931.

London's Shipping.

During the week ended December 2nd, 843 vessels, representing 881,383 net registered tons, used the Port of London; 406 vessels (686,366 net registered tons) were to and from Colonial and foreign ports and 437 vessels (195,017 net registered tons) were engaged in coastwise traffic.

* * * *

During the week ended December 9th, 1,079 vessels, representing 931,157 net registered tons, used the Port of London; 452 vessels (725,968 net registered tons) were to and from Colonial and foreign ports and 627 vessels (205,189 net registered tons) were engaged in coastwise traffic.

* * * *

During the week ended December 16th, 860 vessels, representing 1,005,177 net registered tons, used the Port of London; 439 vessels (821,079 net registered tons) were to and from Colonial and foreign ports and 421 vessels (184,098 net registered tons) were engaged in coastwise traffic.

* * * *

During the week ended December 23rd, 891 vessels, representing 994,903 net registered tons, used the Port of London; 473 vessels (802,779 net registered tons) were to and from Colonial and foreign ports and 418 vessels (192,124 net registered tons) were engaged in coastwise traffic.

Hull and the Humber

Rates and Charges at Hull Not Yet Reduced.

IN the report of the Shipping Committee of the Hull Chamber of Commerce and Shipping regret is expressed that dock owners generally, and especially railway-owned dock undertakings, have not yet seen fit to reduce the present level of rates and charges on ships and goods. In the case of Hull labourage operations the increase still stands at 145 per cent. above pre-war. In the matter of dues, wharfage, etc., the increase is 60 per cent. The Committee is strongly of opinion that there should be some relationship between the charges in goods and price levels generally. Retail prices are still more than 40 per cent. above pre-war, while wholesale commodity prices are less than before the war. The Committee is of opinion that this wide disparity is partly due to excessive costs of distribution, including dock dues and charges. In dock dues and charges the cost of labour does not figure largely, and it is difficult to appreciate on what grounds the present percentage increase is justified.

Complaints of Excessive Costs and Restrictions.

The Shipping Committee also refer to the complaints received, particularly from foreign owners, of the excessive cost and restrictions on overtime work at the Humber ports. Necessary steps are being taken to bring about a substantial reduction in the cost of overtime working and an extension of the closing down time on Saturday afternoons. The present restrictions, it is stated, undoubtedly result in the loss of a considerable volume of trade in competition with other districts and Continental ports. The question of the control of trimming at some of the Hull docks has also been raised and is under consideration. A reduction in dock workers' wages brought in its train an adjustment of the percentage addition to stevedores' base tariff rates. This was finally agreed at 85 per cent., as against 100 per cent. prior to the reduction in wages. Adjustments were also made in respect of overtime, extra labour and winch driving. Subsequent events witnessed considerable reductions in other directions. To what extent they were due to the operations of certain independent stevedoring firms or to a desire on the part of stevedores to meet the depressed state of shipping is regarded as a matter for conjecture. The fact, however, remains that stevedoring charges at Hull docks are now at a level which compares favourably with the charges at any other United Kingdom port.

Dock Owners and Third Party Insurance Risk.

Negotiations have taken place regarding the suggestion that the dock owners should take over third party insurance risk on the basis of an addition to the present charge for the hire of cranes. The question was thoroughly examined from all points of view in the hope that suitable insurance arrangements might be made, but unfortunately this was not possible except at a very high figure. It also appeared that some of the larger and constant users were at present in a position to make their own insurance arrangements at rates considerably below those offered by the railway company, even if all users had been prepared to fall into line.

Delay to Vessels owing to Breakdowns.

The attention of the London and North-Eastern Railway, the owners of the Hull docks, has been drawn by the Chamber of Commerce and Shipping to several cases of delay to vessels resulting from breakdowns of the grain silo machinery and of electric cranes and to the lack of supervision, which often meant that the apparatus was under repair longer than necessary. Attention was also drawn to the damage and delay sometimes incurred by steamers as the result of improper mooring of lighters in the Hull docks. Some improvement in all these directions, it is pleasurable to note, has since been made.

Shipping Returns show Decline.

The shipping tonnage entering the Hull docks during January to September was approximately 7 per cent. less than in the corresponding nine months of 1931, notwithstanding a considerable decline in export of coal. At the annual meeting of the Hull Chamber of Commerce and Shipping the retiring president (Mr. C. P. Sherwood) also stated that Hull's position as third port of the United Kingdom was intact—in point of fact the port had more than maintained its former share of the total trade of the country. The value of the exports through Hull was slightly higher than last year, but the value of imports was down, which was to be expected in view of the change in fiscal policy. Imports of wheat and kindred cereals, oil-bearing seeds, nuts and kernels, fruit and vegetables were less, but there were encouraging increases in the imports of hides and skins, wool, petroleum, bacon, etc. Decreased imports of flour, oil cakes and linseed oil were welcome, as they preferred, he said, to see these produced in the Hull mills. Mr. Sherwood added that the decline in the exports of coal from Hull was more than 30 per cent., largely due to the quota of production and minimum price restrictions under the Coal Mines Act.

Difficulties of Coal Shipments.

Hull has also suffered from difficulty which the railway company puts in the way of collieries bringing forward coal for shipment before a steamer arrived, whereas at Immingham the sister port on the Humber, no such difficulty arises. Mr. Minnitt Good expressed the view that with the number of collieries working in groups it should be an easy matter to arrange accommodation for the export coal. So long as there was competition between the respective owners of the Hull docks and Immingham dock, Hull had the largest share of the trade, but now, with the total exports for the Humber for the nine months around 2½ million tons, Hull's share is only 663,000 tons, whereas in 1923, before the effects of grouping the railways had taken place, out of an export of 6,830,000 tons, Hull's share was 3,175,000 tons. Mr. Good commented on the fact that there had been no reduction of dock dues at Hull, and that shipowners were waiting for this overdue relief. His hope is that the pressure now being exerted by the Chamber of Shipping would bring this about. They had, however, obtained through negotiation reductions in the pay of dock labour, and in the cost of trimmings and towage, and a considerable reduction in the stevedoring tariff. An early reduction in pilotage charges was also hoped for. Mr. Minnitt Good has been elected president of the Chamber for the ensuing twelve months.

Future of the Humber Bridge Bill.

The future of the Humber Bridge Bill, under which a road bridge over the Humber between Hull and North Lincolnshire, at a cost of £1,750,000, is still undecided. At the last meeting of the Humber Conservancy Board a letter was received from the Board's solicitor stating that it was within the promoters' power to put the Bill down for third reading in the House of Commons this session, and that the Town Clerk had stated that the promoters had as yet no definite financial proposals to place before Parliament. It was not expected that the promoters would put the Bill down for third reading before the Christmas recess, but the Town Clerk has promised to give the Humber Conservancy Commissioners, who are opposing it in the interests of the shipping and navigation of the river, as long notice as possible of the Corporation's intentions.

Proposed Reduction in Goole Pilotage Rates.

The proposal to reduce the Humber and Goole pilotage rates by 10 per cent. is to be the subject of an inquiry by the Board of Trade, at which all sides will be represented and heard. Hull was suggested as the venue of the inquiry, but the Pilotage Committee of the Humber Conservancy Board decided in favour of an informal hearing at the Board of Trade offices in London, on the understanding that any decision of the Board shall be binding on all parties. To this course the shipowners' and pilots' representatives on the Committee assented.

Decline in Imports at Goole.

The general trade of the West Riding Port of Goole has perceptibly declined. Imports, it is stated, have been seriously affected by the introduction of import duties, it being estimated that for the January-October period the decrease is over 19 per cent. as compared with the corresponding ten months of 1931, while the general export trade has declined about 5 per cent. The coal export trade has been badly hit, the shipments to places abroad during the ten months being but 584,952 tons as compared with 849,600 tons; coastwise shipments, 783,638 tons against 788,823 tons; and bunker coal 91,562 tons against 112,285 tons. The total decrease is 290,556 tons, equal to 16 per cent. In 1931 the decrease as compared with 1930 was 246,112 tons. Coke shipments have also fallen off.

Immingham Dock Statistics.

During the month of November a total of 118 vessels, representing a net registered tonnage of 142,171, used Immingham Dock, including 23 vessels totalling 32,238 net registered tons using the Western Jetty coaling berth, as compared with November, 1931, when 123 vessels totalling 166,931 net registered tons used the port, including 20 vessels totalling 33,790 net registered tons using the Western Jetty.

Scottish Harbour Notes

Clyde Navigation Trust.

THE principal item affecting the Port of Glasgow was the decision of the Clyde Trustees to adopt the recommendations of a Special Committee on De-rating Relief, which recommended the continuance of the existing percentage rebates from charges leviable by the Trustees for the assessable year from Whit-Sunday, 1933. The report showed that the relief to the Trustees from local rates for the year 1932-1933 was estimated at £77,000.

Under the recommendations a 30 per cent. rebate from the revenue derived from the rates is allowed on coal, coke, iron ore, and limestone and lime—foreign and coastwise, inwards and outwards; 30 per cent. on all goods foreign, outwards, classified under the heading " Iron or Steel," and various classes of machinery; 30 per cent. on all new vessels, and 30 per cent. on the gross registered tonnage of vessels for the use of the graving docks.

It is estimated that these rebates would, for a year, result in a total relief of £82,909. The rebates in respect of coastwise goods are intended to help the coasting trade to effect a reduction in their charges with a view to increasing sea-borne traffic. The whole subject will be reconsidered next September .

Additional Loan Required for Nairn Harbour Works.

Nairn Town Council has decided to borrow an additional sum of £10,000 to meet the cost of the new harbour undertaking, the total cost of which, it is now calculated, will be £61,000. At a recently-held meeting of the Council it was stated that the actual amount spent on the harbour up to date was £54,206, although it had been originally estimated that the total cost would be £47,000. It was further explained that the reason for the increased cost was that the Fishery Board engineer had come forward with various suggestions, and the local authority had to carry out the instructions of the Fishery Board, who were putting down part of the money. A member asked if the Town Council had not given a pledge to the ratepayers that the harbour undertaking would not exceed the sum of £47,000,but it was explained that no such pledge was given by the Council as at present constituted.

Controversy over Harbour Rates at Aberdeen.

Opposition to the clause containing the schedule of rates was encountered when the local Harbour Rates Order, 1933, came up for approval at a meeting of the Aberdeen Harbour Board. The Order (it was explained) proposed to reduce the rates on goods and to increase the rates on ships. Objecting to the clause in question one member felt that it was wrong to shut the door against mercantile ships, and he contended that the open door at the cheapest possible rate was the best policy for any port on the east coast of Scotland. Unless they encouraged ships to come to the port (this speaker added) they would never get business. Another member, on the other hand, expressed the feeling that they were encouraging ships in this respect and were giving more than they were taking. They were giving more in goods, and in doing that they were inducing people who were bringing into Aberdeen and sending out of Aberdeen to buy more, and the ships would get more freights.

Removal of Sand from Montrose Foreshore.

At a recently-held meeting of Montrose Harbour Board the receipt of a letter was reported from the Board of Trade with regard to the removal of sand from the foreshore and the beach. This letter stated that the Board of Trade was not satisfied with the method in which the sand was removed, and that they wanted a more accurate measure taken of the amount of sand that was lifted. After consideration it was decided that the best way would be to have every load of sand taken away weighed at the public weighing measure at the dock, and that the Board of Trade be asked to pay half the weighing cost. During the discussion the Convener of the Harbour Committee explained that half of the revenue derived from the sale of sand removed from the foreshore was paid to the Board of Trade, who, according to their letter, were dissatisfied with the way in which the Trustees obtained the weight of the sand removed. It appeared that the only way the weighing could be done to satisfy the Board of Trade was to have all the loads taken away passed over the dock steelyard, and this was recommended to be done. His Committee, he concluded, had asked the Board of Trade to pay half of the cost of the weighing.

Annual Meeting of Elgin and Lossiemouth Harbour Company.

At the annual general meeting of the shareholders of Elgin and Lossiemouth Harbour Company a decrease in the revenue for the past year as compared with the previous year was reported. This decrease, which amounted to £676, it was explained, however, was more apparent than real. There had been no revision of the harbour rates since the year 1901, and many of these rates were now out of date. It was proposed to apply for a provisional order authorising the company to make special increases and amendments on these charges so as to place the company in a position similar to other neighbouring ports. This was rendered necessary by the cost of maintaining the harbour, but the assurance was given in the annual report of the company that traders might rest assured that the rates for which authority was being asked would not necessarily be charged in full.

Bremen's Seagoing Shipping Traffic during October, 1932

In October 612 vessels arrived for Bremen account with 642,146 net registered tons. Compared with the previous month the number of vessels fell by 79, the tonnage by 19,221 net registered tons, equal to 3 per cent. Compared with October, 1931, there were 53 more vessels; however, there was a decrease in tonnage of 43,646 net registered tons, equal to 6 per cent. In the months from January to October, 1932, altogether 6,475,243 net registered tons arrived; this is 706,331 net registered tons or 10 per cent. less than in the same period in 1931.

Against this, sea-borne goods traffic of the five most important Weser ports in October, both in imports and exports, had the highest monthly figures of the current year; 289,000 tons were imported, that is 58,100 tons or 25 per cent. more than in September, and also 9,600 tons or 4 per cent. more than in October, 1931. The reason for this increase is chiefly due to the almost doubled cotton import in the month under report, compared with the months for comparison. Exports amounted to 221,400 tons, and thus exceeded September by 15,100 tons or 7 per cent., and October, 1931, by 48,500 tons or 28 per cent., chiefly through larger shipments of coal *via* Hordenham and of piece goods. Imports and exports together amounted to 511,300 tons, against 438,100 tons in the previous month (equal to plus 17 per cent.).

In the first ten months of the year altogether 3,956,800 tons were imported and exported, against 4,246,400 tons in the same period of 1931. The fall in traffic compared with the previous year, which amounted to 12 per cent. up to the end of July, 10 per cent. up to the end of August, and up to the end of September 9 per cent., was further reduced to 7 per cent. through October. It amounted to 289,600 tons, against 347,700 tons at the end of September.

In detail in the months from January to October imports amounted to 2,427,800 tons, and exports to 1,529,000 tons. The former showed a decrease of 135,200 tons or 5 per cent., the latter of 154,400 tons or 9 per cent. The greatest losses were in the arrivals of piece goods and ore—through the closing down of the Bremen foundry—and in exports besides piece goods, on potash, salt and iron.

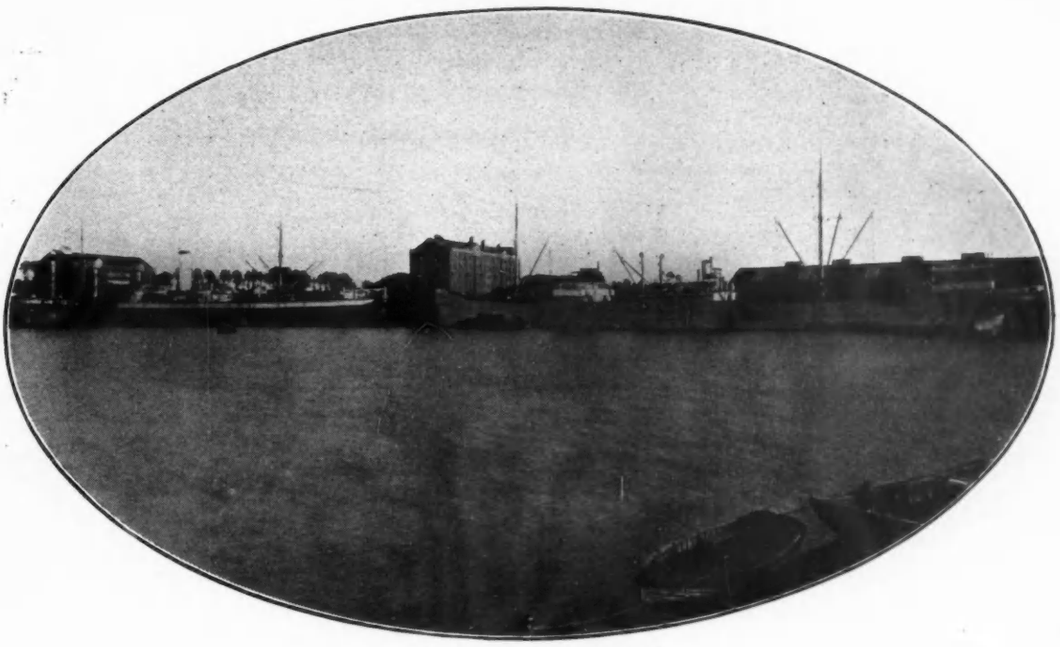
Tenders Invited for Hopper Barges for Brazil

H.M. Consul at Porto Alegre reports that the port directorate of the Port of Rio Grande do Sul is calling for tenders, to be presented in Rio Grande do Sul by February 17th, 1933, for the supply of three hopper barges of the following dimensions:—

Length overall, 34—38 metres.
Width, 7—8 metres.
Depth, 2.50—3.0 metres.
Capacity of tank, 250 cubic metres.

Firms desirous of offering hopper barges of United Kingdom construction can obtain the further details of this call for tenders, together with particulars of the " Special Register " service of information, upon application to the Department of Overseas Trade, 35, Old Queen Street, London, S.W.1. Reference No. A.X.11635 should be quoted.

The Port of Gloucester



View of Sharpness Docks.

GLOUCESTER as a port dates from the time of Queen Elizabeth, but it was not until the opening of the Ship Canal—projected in 1793 and completely opened in 1827—that it became of commercial importance, and the largely increasing size of vessels later on led to the construction in 1874 of the docks at Sharpness at the seaward end of the Canal some sixteen miles below Gloucester.

A Pilotage Authority for the Port of Gloucester was constituted in 1861.

The Ocean Dock at Sharpness provides accommodation for vessels up to 9,000 tons capacity, and by means of the Ship Canal vessels up to 1,000 tons capacity navigate to Gloucester Docks.

These docks are only 51 miles from the City of Birmingham, thus Gloucester is often referred to as the most inland port of Great Britain, and the River Severn, with the canals which link up with Birmingham, form the natural waterway between the Midlands and the sea.

Below Sharpness the open waterway is controlled by the Gloucester Harbour Trustees, who maintain an efficient system of marking the channel by lights, beacons and buoys, and above Gloucester the River Severn is under the jurisdiction of the Severn Commissioners, on which bodies the Sharpness Docks Company have representatives. The canals between Sharpness and Gloucester, and between Worcester and Birmingham, are owned and maintained by that company.

The chief traffics using this waterway are: Grain, flour, wood goods, petroleum oils, coal and salt. The tonnage using the port and waterway at the present time is much below its capacity, but during the past year about 500,000 tons of goods have been handled.

Sharpness Docks.

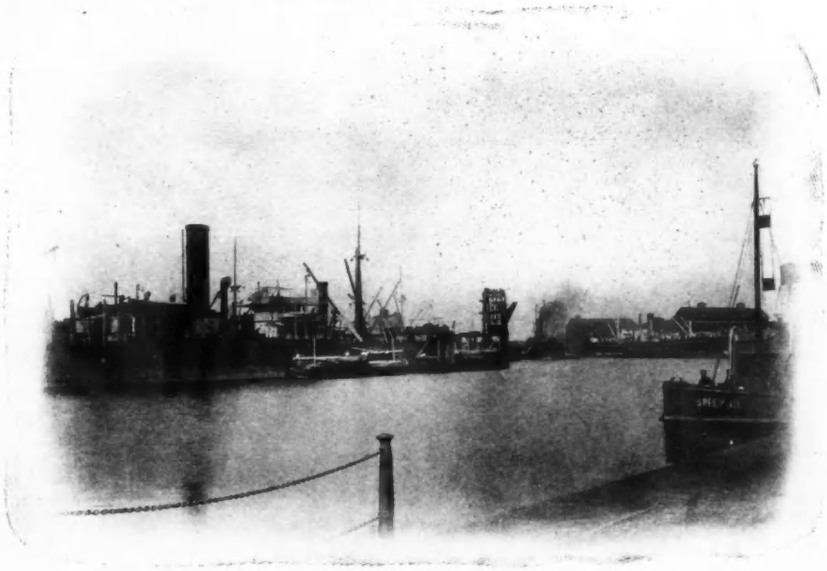
The dock entrance consists of a tidal baisn and lock, which together are 900-ft. long, the minimum width of the lock being 57-ft. The depth of water on the outer cill at mean Spring tides is 29-ft. There is a water area of 20 acres and 5,600-ft. of quays and wharves.

The lock gates and other machinery are operated by hydraulic power.

The special appliances for dealing with cargoes consist of two floating pneumatic elevators which can discharge 230 tons of grain per hour, cranes having a lifting capacity up to 30 tons, and a large number of steam winches.

The south side of the docks is largely taken up by grain warehouses, and a large portion of the land adjacent to the docks is laid out as timber stacking grounds, on which numerous sheds are also provided for storing wood goods.

Other equipment includes coal tips, one of which is hydraulic, for the shipping of coal conveyed from the Forest of Dean coalfield, which is only six miles distant. On the north side of the entrance lock is a graving dock, equipped with engineering plant for carrying out all kinds of repairs to ships.



Another View of Sharpness Docks.

Gloucester Docks.

The Gloucester and Berkeley Ship Canal is the connecting link between the Sharpness and Gloucester Docks. It is 16½ miles in length and is without a lock throughout the whole distance. It has an average width of 90-ft. and a normal depth of 15-ft. These docks, opened in 1827, were enlarged in 1849 and 1892. The total water area is 14 acres, and there are over 10,000-ft. of quays.

Gloucester Docks are specially suited for the smaller class of coastwise and Continental steamer carrying up to 1,000 tons of cargo.

Around the quays are stores for grain and general goods. One of the docks, with an area of about 40 acres of land, has been set apart for oil storage, and during the past five years all the principal petrol importing companies have established depots there.

The canal frontage leading to the docks is largely taken up with timber stacking grounds and storage sheds of a number of important timber importers.

The Port of Gloucester—continued

An adequate supply of cranes, electric hoists and floating winches form part of the equipment for dealing with all classes of cargo.

At Sharpness and Gloucester Docks vessels can discharge their cargoes direct into canal boats which navigate the inland waterways without intermediate transhipment, and traffic proceeding to these waterways gain direct access through the lock connecting the docks with the canalised River Severn, which is traversed for 30 miles to Worcester, where the dock company own and maintain the inland canal which runs for 30 miles through a number of industrial areas to Birmingham.

The docks are well supplied with railway lines and sidings which connect with the L.M.S. and Great Western Railway Companies' lines, and the increase in the use of road transport has been provided for by numerous improvements to the dock roads.

North-East Coast Notes.

Rally in Tyne's Coal Trade.

ADDRESSING the annual meeting of the Tyne Improvement Commissioners in November, the chairman, Mr. H. P. Everett, reviewed the principal features of the current year, which, he said, had been an uncomfortable period. Mr. Everett said coal exports had fallen last year to 14 million tons and the shipments thiis year were becoming less month by month. At one period it looked as if 12 million tons would not be reached during the year.

Fortunately the decline was arrested in August, and in September they were able to report an increase over the previous March-October quantities, and it would appear that, barring unforeseen causes, later months would do equally well. The fear of having less than 12 million tons was passed. They now expected about 12½ million tons, which was 1½ million tons less than last year and 7½ million tons less than in 1929—a matter of great regret. As they would realise from the fact, their revenue had decreased. Each million tons meant about £25,000 for them, but their budget would be balanced. They had followed the lead of the National Government in money operations. Interest costs were being gradually reduced. They were at present receiving on loan all they required at 3¾ per cent.

Mr. Everett thought that there were no terms too strong to condemn the Coal Mines Act. "I have," he said, "been through figures and arguments over and over again till I was weary. I have studied it from all sides, desiring to see, if possible, what reasons there can be for its continuance. I can find none. It has provided benefits neither to employers nor to employed. In my opinion, both would have been better without it, and in the meantime both are paying very heavily for the experiment. But as I have stated before, there are other interests concerned in the matter. The restrictions affect the ports and all the various trades attached to them. In consequence of reduced shipments there are fewer opportunities for employment in the ports, and the results go far back into the hinterland. In justice to the Government, with many departments of which we have been often in conference over this matter, they apparently believe in the Act, and the Mines Department are working to the best of their ability."

With regard to laid-up tonnage, Mr. Everett said in August the number of laid-up vessels was 180 and the tonnage was 391,000 tons. That had been gradually reduced, and at the middle of November the figure was 148 vessels of 325,000 net registered tons.

The trade reports for the ten months ended October 31st showed that the imports of petroleum spirit in bulk totalled 37,134 tons, an increase of 6,591 tons on the corresponding period of 1931. The coal and coke shipments for the same period were 10,391,277 tons, a decrease of 1,184,068 tons, or 10.23 per cent., on 1931. There was an increase of 6,080 tons in the coke shipments in October, or more than 6 per cent.

Some Promising Signs.

Mr. Everett was re-elected chairman, and in reply said there were signs of better trade conditions. There were numerous straws to show which way the wind was blowing. There were fewer laid-up ships, more coal inquiries, and there was a spirit among them to go forward with renewed confidence. He trusted the day was not far off when prosperity would return to the Tyne.

Sir Arthur M. Sutherland was re-elected deputy-chairman.

New Chamber of Commerce Secretary.

In succession to Mr. Herbert Shaw, who retired at the end of December from the position of Secretary of the Newcastle and Gateshead Chamber of Commerce, that body has appointed Mr. Gerald S. F. Ritson, M.A. (Cantab), of St. Bede's Terrace, Sunderland. In addition to the secretaryship of the Chamber, the appointment carries with it the secretaryship of the Commercial Exchange, Ltd., and the joint secretaryship of the North-East Coal Exporters' Association.

Mr. Ritson was secretary to Messrs. F. and W. Ritson, directors and managers of the Nautilus Steam Shipping Co., of which his father, Mr. Stanley M. Ritson, was formerly managing director.

Blyth and Wear Trade Figures.

The November meeting of the Blyth Harbour Commission was informed by Mr. Ridley Warham, the chairman, that coal shipments for the ten months ended October 31st showed an increase of 7 per cent. on 1931, and a decrease of 2 per cent. on 1913. He stated that as the position of affairs in the coal trade had improved somewhat of late it was hoped that the improvement in shipments during the last few weeks would be maintained up to the end of the year.

There was considerable falling off in coal and coke shipments from Sunderland during October. The total shipments were 344,189 tons, as compared with 471,181 tons in October last year. The reduction in that month accounts for more than half of the aggregate reduction during the first ten months of 1932. From January to October inclusive the shipments from Sunderland have been 3,763,112 tons, as compared with 3,932,120 tons in the same period of last year.

Other exports during the first ten months of this year have amounted to 44,577 tons, against 52,945 tons in the corresponding months of last year. The exports have comprised: 1,059 tons of machinery, 1,328 tons of iron and steel, 10,411 tons of pitch and tar, 6,229 tons of creosote, 16,150 tons of petroleum, and 9,400 tons of sundries. Imports during the ten months this year have totalled 232,908 tons, as compared with 261,043 tons in the first ten months of last year. Details of the imports are: 80,107 tons of timber, 4,026 tons of grain, 16,134 tons of esparto grass, 1,916 tons of iron ore, 15,031 tons of cement, 56,094 tons of petroleum, 4,463 tons of wood pulp, 2,959 tons of iron and steel, and 52,178 tons of sundries. There were increases in the amounts of timber, esparto grass and wood pulp.

Improvement on the Tees.

Statistics presented at the December meeting of the Tees Conservancy Commission at Middlesbrough showed that only 7,901 tons of iron and steel were imported in October and November, as compared with 34,668 tons in the corresponding period of last year and 14,855 tons in 1913. The detailed figures were: October, 1932, 7,692 tons; 1931, 15,663 tons; 1913, 9,807; November, 1932, 209 tons; 1931, 19,005 tons; and 1913, 5,048 tons.

Canada replaces Russia in October Wheat Imports by Great Britain

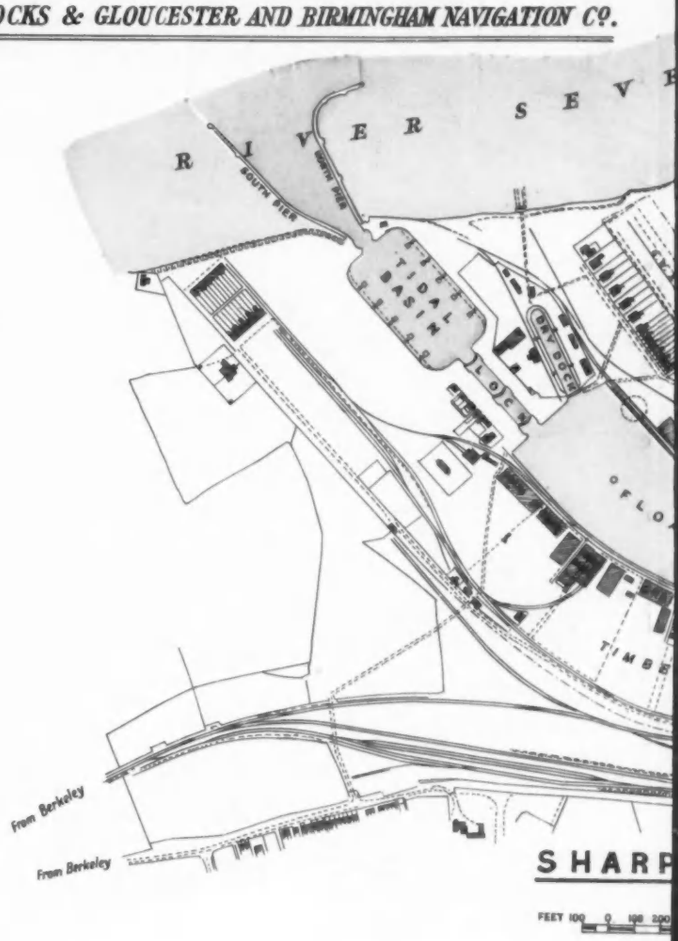
The October Trade and Navigation Report of the United Kingdom shows that Canada that month almost exactly replaced Russia in the leadership that country held in the same month of 1931 in wheat imports by Great Britain. The British October imports converted to bushels were:—

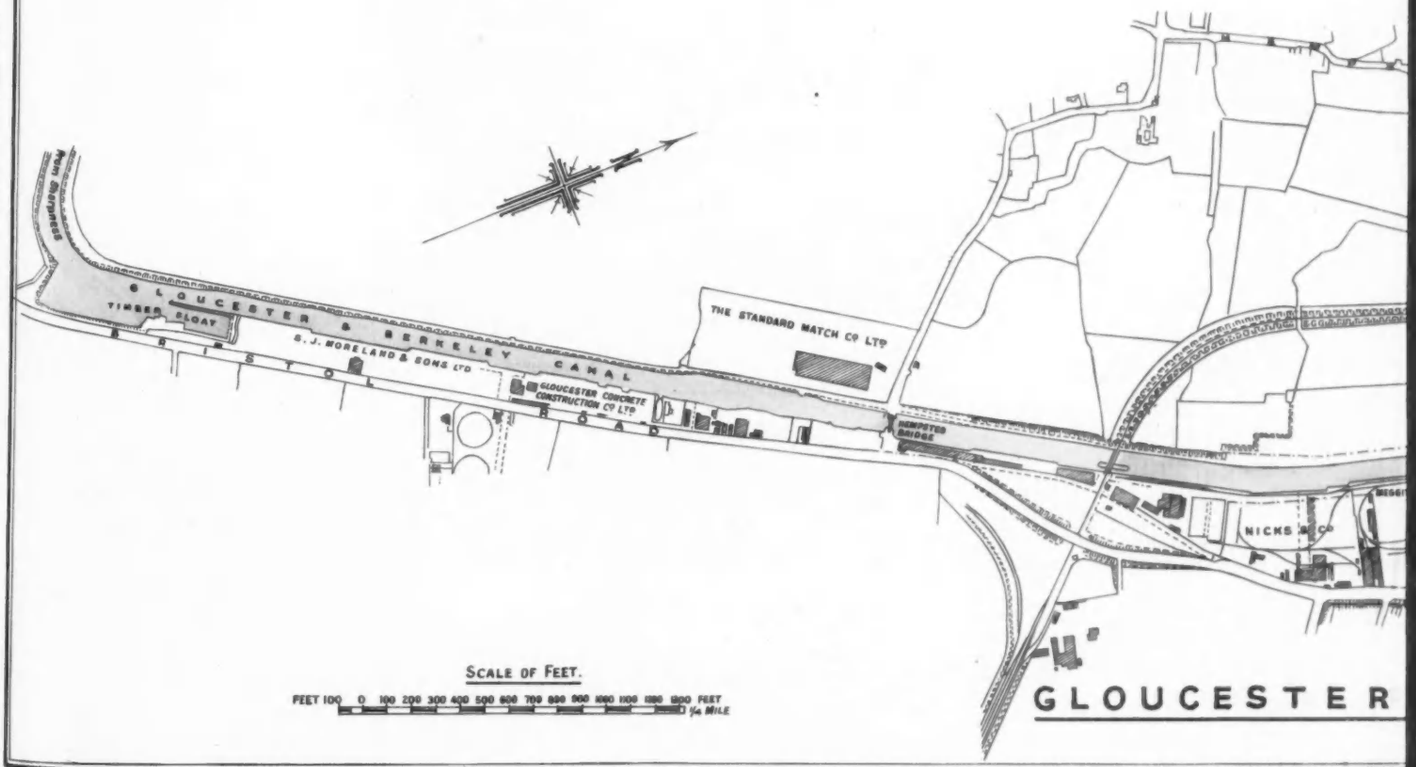
	1931 Bushels	Per Cent.	1932 Bushels	Per Cent.
Soviet Russia ...	11,697,143	43.2	3,061,974	15.6
United States ...	2,279,656	8.4	602,636	3.2
Argentine	2,822,946	10.4	914,080	4 7
British India ...	30,530	.3	—	—
Australia	3,409,376	12.6	1,141,324	5.8
Canada	3,429,707	12.7	11,204,629	57.2
Other Countries ...	3,346,184	12.4	2,708,005	13.5
	27,075,542	100.0	19,632,648	100.0

These are unrevised British import figures. Since comparatively little Canadian wheat has moved *via* United States ports in either of the last two years—British imports being credited to the country from whose ports the wheat departed—the error to be adjusted is small.

PORT OF GLOUCESTER.

UNDER THE JURISDICTION OF THE SHARPNESS NEW DOCKS & GLOUCESTER AND BIRMINGHAM NAVIGATION Co.

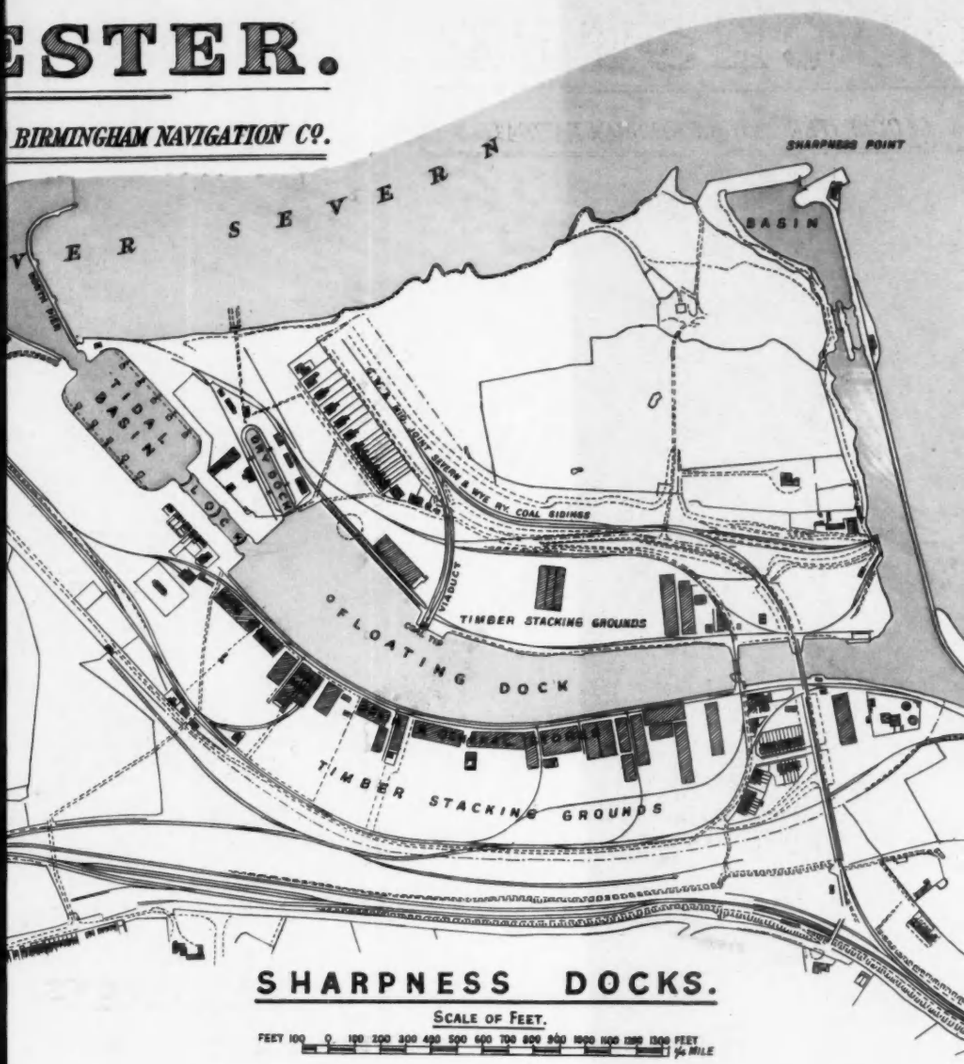




WARD & FOXLOW LTD. LITHOS. 19.

ESTER.

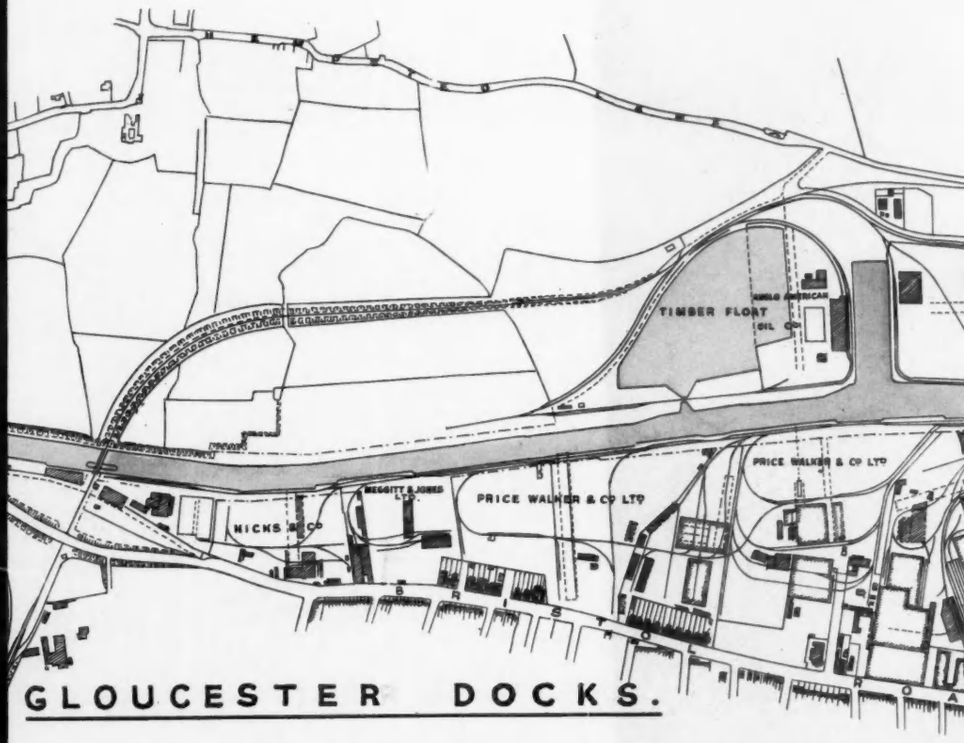
BIRMINGHAM NAVIGATION Co.



SHARPNESS DOCKS.

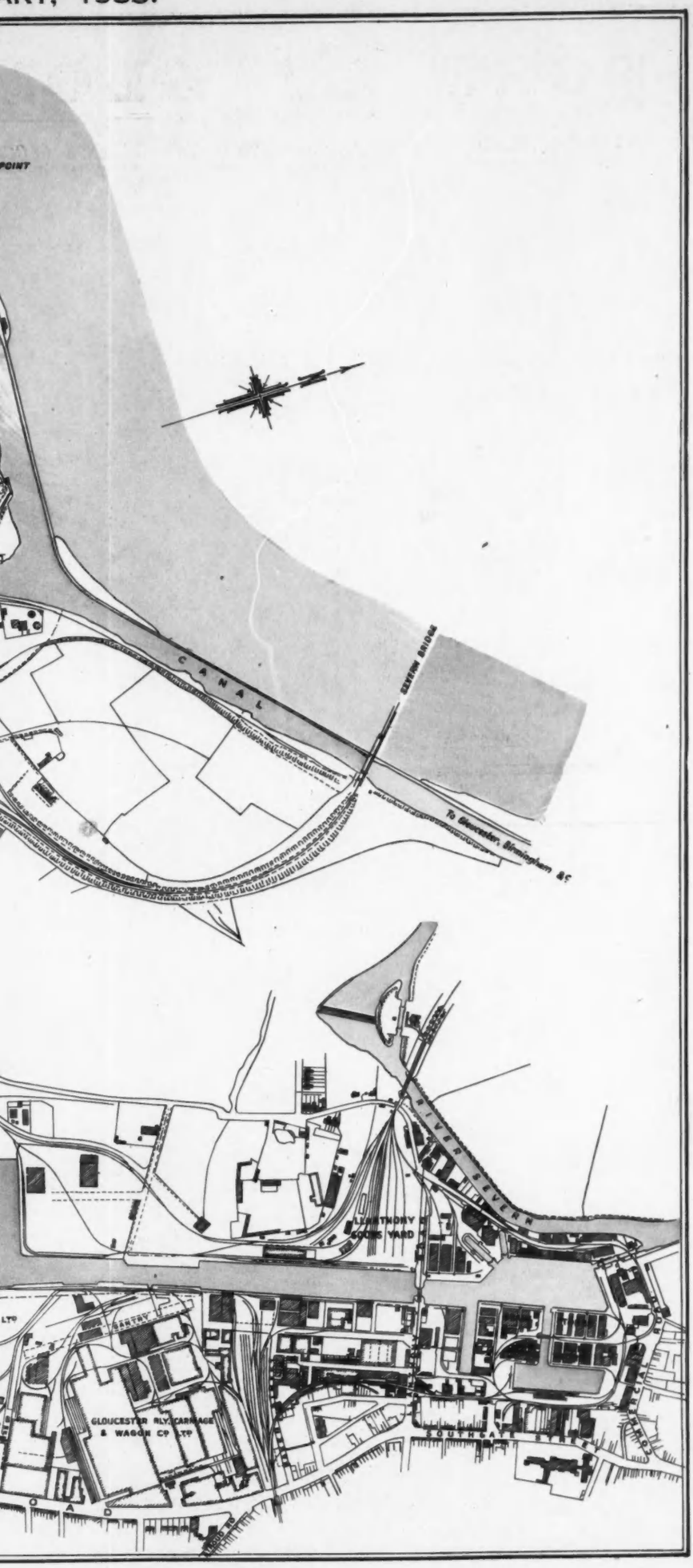
SCALE OF FEET.

FEET 100 0 100 200 300 400 500 600 700 800 900 1000 1100 1200 1300 FEET
1/4 MILE

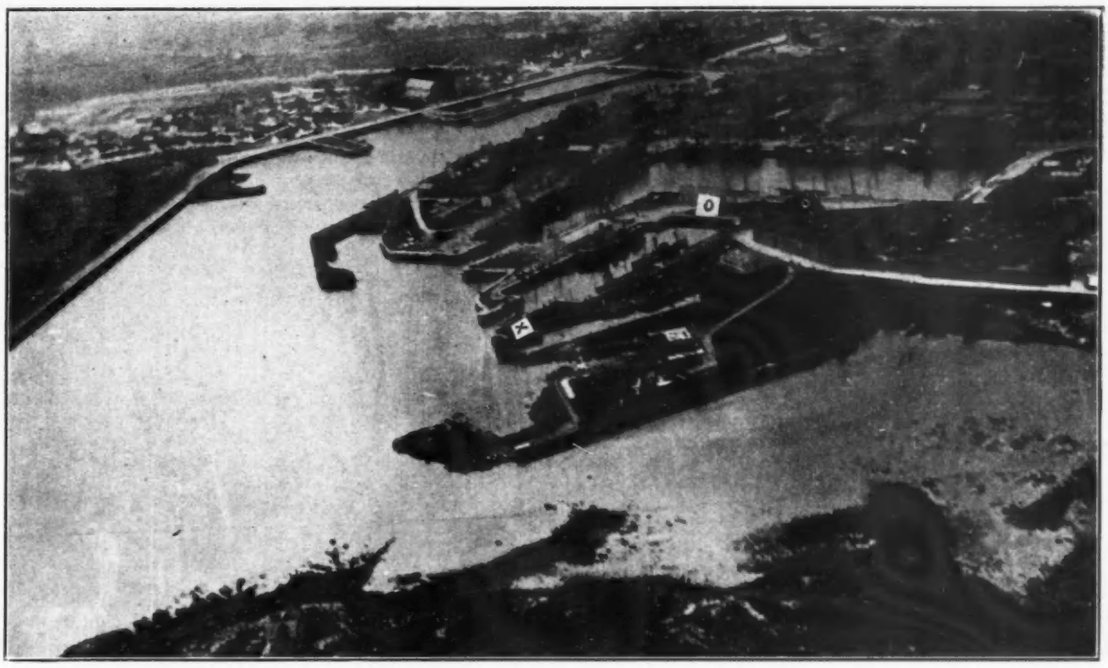


GLOUCESTER DOCKS.

WARD & FOXLOW LTD. (LITHOS), 19, HARCOURT STREET, W.1.


POINT
CANAL
SEVERN BRIDGE
To Gloucester, Birmingham &c
RIVER SEVERN
LLOYDS
GLOUCESTER RLY. CARRIAGE
& WAGGON Co. LTD
SOUTH QUAY

Irish Harbour Matters



Photo] ***Contemplated Improvements at Galway.*** ["Irish Times"

These include an Extension of the Pier (marked X) for a distance of 350-ft.; the linking of the two existing Docks (where marked O); the general deepening of the Entrance to the Dock by excavating the hard green stone immediately in front of the Dock; and the dredging of the Outer Channel.

Galway

Galway Harbour Improvements.

AN official notice states that application is intended to be made to the Oireachtas of Saorstat Eireann in the year 1933 by the Galway Harbour Commissioners, the Galway County Council and the Galway Urban District Council for leave to bring in a Bill :—

(i) To empower the said Commissioners to carry out a scheme for the development of Galway Harbour to be executed in two stages as follows :—

STAGE 1.

The deepening of the approach Channel and the removal of the rock barrier obstructing the entrance to the Deep Dock (Dun Aongus Dock). The construction of a pier running in a south-easterly direction from the eastern side of the Deep Dock entrance to facilitate vessels entering and leaving the docks. The completion of the existing unfinished Deep Dock and the provision of new entrance gates for same. Such other incidental works as may be necessary for the execution of the foregoing.

STAGE 2.

The linking together of the Commercial and Deep Docks and the deepening of the Commercial Dock. The closing of the Commercial Dock entrance so as to form a road access from the West Quay of the Commercial Dock to the West Quay of the Deep Dock. The widening out of the North and West Quays of the Commercial Dock where necessary to provide for the greater depth of water alongside the deepened portion of the Commercial Dock and such other incidental works as may be necessary.

(ii) To empower the said Commissioners to provide rail sidings, cranes, weigh-bridges, harbour offices and sundry other items of equipment and accommodation for the more efficient working of the said harbour.

(iii) To confer on the said Commissioners such borrowing powers as may be necessary to enable the said scheme of development to be carried out and the foregoing matters to be provided for.

(iv) To empower the said Commissioners to apply their existing tolls, rates, duties and other revenues for the foregoing purposes.

(v) To make provision for the striking of special rates of 4d. in the £ by the Galway County Council and the Galway Urban District Council respectively, the proceeds whereof shall be applied exclusively for the purposes hereinbefore mentioned in manner provided in the said Bill.

(vi) To confer on the said Commissioners such incidental or other powers as may be necessary in connection with the above purposes.

(vii) To make such alteration or modification as may be necessary in the statutory provisions regulating the constitution of the Galway Harbour Commissioners so as to provide that the said Commissioners shall consist of the following members, namely—

(a) EX-OFFICIO MEMBERS—3 (three).
The Chairman for the time being of Galway County Council.
The Chairman for the time being of the Finance Committee of the Galway County Council.
The Chairman of the Galway Urban District Council.

(b) NOMINATED MEMBERS—8 (eight).
Five persons to be nominated by the Galway County Council in such manner as to give one representative to each of the five County Electoral areas.
One person to be nominated by Galway Urban District Council.
Two to be nominated by the Minister for Industry and Commerce.

(c) ELECTED MEMBERS—12 (twelve).
Twelve persons to be elected on the Franchise and Membership qualification prescribed for the election of Harbour Commissioners by the Galway Harbour and Port Act, 1853, subject to review of the said Franchise and Membership qualification by the Minister for Industry and Commerce after the first election and before the second election. Provided that any person elected or appointed in any one of the modes in the said Bill prescribed shall while so elected or appointed be ineligible to be appointed or elected in any other manner.

Plans, specifications and books of reference have been deposited with the Principal Clerk of the Private Bill Office, the County Registrar of the County of Galway, the Secretary of the County Council of the County of Galway and the Secretary of the Urban District Council of Galway.

Copies of the Bill can be obtained as from December 21st, 1932, at the respective offices of the promoters and at the office of the Parliamentary Agent, Mr. R. M. Kieran, 27, South Frederick Street, Dublin.

It is expected that the scheme will be supported by all parties in the Dail, as no financial assistance will be required. On the other hand, opposition may be expected from the representatives of Cobh (Queenstown).

Irish Harbour Matters—continued

In connection with this scheme Sir Cyril Kirkpatrick, London, paid a visit to Galway, together with some of his engineers, and at a special meeting of the Harbour Board, Mr. T. C. McDonough presiding, Sir Cyril Kirkpatrick was shown the results of recent borings and the reading tests taken at the harbour. Sir Cyril was pleased with the result and said he was convinced that the scheme was a sound one, that there would be little or no silting, and that the ultimate success of the project was certain.

When completed this scheme would provide for the establishment of a civil airport on a site yet to be decided, but probably at Oranmore, six miles out of the town, for the purpose of organising a " feeder " service of aeroplanes to Dublin to connect with an aerial artery—which a private company proposes to establish—to the Continent.

Another plan is that of the Irish Trans-Atlantic Corporation. Primarily a sea and air port will be established on the shores of Galway Bay, and later, when it is considered that aviation is sufficiently developed, an air service from Galway to the American continent will be started. Furbough, seven miles west of Galway, is the site which this Corporation proposes to use for its scheme. By a further scheme of drainage and reclamation it is proposed to make a new harbour and docks somewhat resembling Southampton. This scheme would cost £2,500,000. It is expected that the culmination of the Corporation's plans would be the operation of a trans-Atlantic air service with Galway as the European terminal. The Irish Free State, British and Canadian Governments have expressed their approval of the project.

Dundalk

Quay Building at Dundalk.

At a meeting of the Dundalk Harbour Board, Mr. C. P. Glendon moved that the Government be asked for a relief grant towards the completion of the work of quay building which was started several years ago, and on which the Board had spent £40,000. Mr. Glendon believed that the work could be done for £20,000, and added that if the Government gave half the cost the Board might be able to go on with the work.

The chairman, Mr. T. McGahon, said it was the view of the majority of the Board that they could not spend any more on capital works. Having spent £40,000 of their own money, which had to be repaid, they were in a position to ask for a free grant, but they had to be extremely prudent, so that they could keep on making repayments of their loans.

Mr. Glendon said that if they spent money on accommodation for the landing of timber, cement, artificial manures and other commodities, it would be a paying proposition.

The chairman was afraid there would be a reduction in harbour income owing to the country's change of policy. They were going to produce at home many of the things hitherto imported, and while he was glad of that, it was bad business for a Harbour Board. In addition, their exports were going to be reduced. His personal belief was that the Board was not in a position to spend thousands of pounds on development of their quays.

It was ultimately decided to ask the Government for a free grant to continue their concrete quays, so as to relieve unemployment.

Wexford

Improvement of Wexford Harbour.

In connection with the proposed improvement of Wexford Harbour, as outlined in a scheme submitted with the report of a survey which was made this year, a Wexford deputation comprising Messrs. R. Houston, H. W. Savile, W. B. O'Connell, L. J. Barker and Alderman J. Billington, with Messrs. D. Allen, T.D., J. Keating, T.D., and Ald. Corish, T.D., waited on the Minister for Industry and Commerce.

The Minister said that it was his desire that harbours like Wexford should be made navigable, and he was prepared to recommend that a loan should have a Government guarantee.

Mr. Hugo Flinn, Parliamentary Secretary to the Minister for Finance, when questioned said that the amount of money at his disposal for the relief of unemployment was rather small in view of the estimated cost of the work, and that allocations were already made in various areas. If, however, the Harbour Board would apply formally, he would endeavour to find out if funds would be available from any other source.

Sligo

Sligo's Declining Shipping.

Mr. Campbell Perry, on being elected chairman of the Sligo Harbour Board for the ninth year in succession, stated that up to August last things looked like breaking the record of 1931. As a result of the tariff war the port was losing at both ends. " One striking example of the effect of these tariffs on our revenue is that our receipts for dues for imports and exports from the Sligo Steam Navigation Co. alone are reduced by £700 compared with the same period last year. This company, locally owned and managed, expended two years ago £50,000 on the new steamer " Sligo," a vessel on which no expense had been spared to fit her out for carrying livestock and perishable goods, with the result that last year the company greatly increased this traffic. For the last few months, however, the vessel had been sailing with less than half her usual cargo. A similar state of affairs applies to the import trade of the company, the average tonnage being diminished from about 500 to 200 tons per week. The effect is that our revenue is disappearing and dock labourers whose average wages amounted last year to 20s. weekly had only been earning 9s. weekly for the last three months.

The receipts of the Burns-Laird Line showed little change compared with last year, due to the fact that, although the exports of livestock had decreased, the loss was counteracted by an increase of 1,000 tons in the export of eggs. Imports of maize showed an increase of 3,500 tons up to the end of November, and a cargo of 5,000 tons was due to arrive before Christmas. The total revenue from this commodity amounted to over £4,000 per annum. It was not probable that this would continue, as it was the present Government's policy to exterminate altogether the importation of maize.

Dublin

New Flashers for Dublin Port.

At a meeting of the Dublin Port and Docks Board it was decided to accept the tender of Messrs. Chance Bros., at £731, for furnishing buoys at the port with 17 new flashers. The engineer reported that he had an assurance from the Government Departments concerned that the materials would not be liable to duty.

In answer to a question by the Lord Mayor, the chairman, Mr. W. Baird, said that everything possible was being done to give employment at the present time, and that a deputation had been appointed to interview the Minister for Industry and Commerce on the subject.

Belfast

Meeting of the Belfast Harbour Board.

At a meeting of the Belfast Harbour Board on December 6th Mr. R. E. Herdman, D.L., presiding, the Harbour Master read his report. This showed that 304 vessels had arrived at the port during the period from November 15th to December 3rd. Of this number, 279 were coastwise and cross-Channel, 18 foreign, and 7 non-trading vessels. The tonnage which had arrived at the port from January 1st to December 3rd totalled 3,403,124, made up as follows: Coastwise and cross-Channel, 2,607,838; foreign, 710,232; non-trading, 85,054. These figures showed decreases of 19,583 tons, 6,947 tons, 8,610 tons, and 4,026 tons respectively.

The general manager submitted particulars of certain works which, although not immediately required for the Board's purposes, might be undertaken at once as a means of providing further employment. They were the square setting of a portion of the roadway at the corner of Queen's Quay and Abercorn Basin, the square setting of a portion of the roadway at the north-east corner of Abercorn Basin and several other small works.

It was decided that harbour rates be not charged on the motor vessel " Ulster Prince," on which the Prince of Wales travelled from Liverpool to Belfast, and on " H.M.S. Dorsetshire " and " H.M.S. Exeter," which arrived in the port in connection with the visit of His Royal Highness.

The general manager and secretary, Mr. M. J. Watkin, was nominated as the representative for Northern Ireland on the Executive Committee of the Dock and Harbour Authorities' Association for next year. Mr. Watkin has also been nominated by the Londonderry Harbour Commissioners.

Ten Months' Imports of Wheat by Great Britain

During the first ten months of 1932 British imports of wheat were as recorded below. Canada was second in 1931, but is now first amongst the supplying countries.

	1931 Bushels	Per Cent.	1932 Bushels	Per Cent.
Russia	44,503,297	23.7	5,760,470	3.4
United States ...	17,797,288	9.5	7,892,621	4.7
Argentine	34,241,447	18.3	37,881,798	22.7
British India ...	862,073	.5	—	—
Australia	40,996,787	21.8	41,046,968	24.5
Canada	42,008,544	22.4	64,722,813	38.7
Other Countries ...	7,136,557	3.8	9,892,827	6.0
	187,545,993	100.0	167,197,497	100.0

Notes from the North

Electric Loading Gear for Manchester.

NEW electrically operated loading gear estimated to cost £510 is to be installed by the Manchester Corporation at its wharf to facilitate the loading of its new sludge steamship, the "Mancunian," which will be delivered in March next. It is necessary to make certain alterations to the loading gear in order to meet the different design of the new boat as compared with the existing steamship "Joseph Thompson." It was intended originally to extend the electric cable to the sludge steamer loading wharf, at a cost of £80, but recent acceleration of the construction of work on the new steamship makes it imperative that the work shall be put in hand forthwith. The Rivers Committee, instead of restricting the capacity of the proposed cable to the necessities of the new steamship, have decided to instal a cable of a greater capacity to meet certain other possible uses of electric current at the Bent Lanes end of the Sewage Works. It is estimated that this larger cable will cost £280.

Blaming the Dock Board.

"Can anything be done to get the Mersey Docks and Harbour Board to reduce their charges in Birkenhead?" This question was asked at the December meeting of the Birkenhead Chamber of Commerce, where it was stated that several big firms had left Birkenhead lately and they said that the Dock Board charges were stifling enterprise.

Ribble Banks.

The Ministry of Health has informed Preston Corporation that it does not see its way to entertain an application for permission to go on with the proposed protection and improvement scheme on the north bank of the Ribble, unless there is any material alteration in the circumstances attendant upon a visit of an inspector.

Progress of Tunnel Engineering Work.

The engineers to the Mersey Tunnel Joint Committee reported on December 14th that the concrete filling, footpath construction, lighting fittings, and gunite rendering throughout the tunnel have been completed, with the exception of the gunite rendering in the under-river section. The placing of the glass dado and cable-laying have commenced. There are 280 men still employed. On the construction of the six ventilating stations £233,000 has been spent. The following return shows the value of the engineering works to date: Headings, £643,582; river tunnel, £1,478,368; Birkenhead tunnels, £815,000; Liverpool tunnels, £678,000; river tunnel roadway, etc., £354,000; ventilation works, £233,000; Walker fans, £17,400; Sturtevant fans, £10,200; lighting fittings, £5,029; driving gear, £39,134, making a total of £4,273,713.

River Weaver Navigation.

To the annual meeting of the trustees of the River Weaver Navigation it was reported that the total tonnage and tolls, with the total net revenue for the past four years ended December 31st, 1931, and for 1932 (approx.) were as follows: January to December, 1928, 762,986 tons, £58,107 tolls, total net revenue £71,257; January to December, 1929, 798,010 tons, £61,794 tolls, total net revenue £74,319; January to December, 1930, 685,873 tons, £45,496 tolls, total net revenue £61,869; January to December, 1931, 607,294 tons, £41,444 tolls, total net revenue £55,432; January to December, 1932, 644,500 tons (approx.), £45,687 tolls, total net revenue £59,666.

During the coming year the following amounts will be required for works on the navigation, viz.: Acton Swing Bridge construction, £5,000; Hayhurst Street bridge repairs, £2,100. In the near future the electrification or otherwise of the Weston dock cranes, gates, etc., will be put in hand as the present hydraulic engines and boilers require replacing. The estimate for this work is £6,000.

Special repair work during the year had been the completion of the repairs of the s.h. "Whale," £1,648, and to two of the hopper boats. Satisfactory progress has been made with the erection of the Acton swing bridge, and it is expected that the work will be completed at the end of 1933.

The Ministry of Transport has agreed to make a grant towards the cost of strengthening the Hayhurst Street Bridge, Northwich, to meet modern road requirements, and the work is being proceeded with.

From correspondence between the Canal Association and the railway companies it appears that the Ministry of Transport may in the near future introduce legislation to carry out the recommendation in the reports made to them regarding the repair and maintenance of roadways over railway and canal bridges, which will include the restrictions of weights passing thereover.

Master Porterage.

Mersey Docks and Harbour Board have adopted revised master porters' rates in respect of tallow in tierces or casks not exceeding 10 cwts. each, and coffee in barrels, and also in respect of rice in pockets not exceeding 50 lbs. each, delivered overside.

A 108-ton Load.

The giant transformer, weighing 92 tons, which is to be installed for the Central Electricity Board at Lockfields, near Clarence Dock, Liverpool, arrived at Canada Dock, Liverpool, by rail from Manchester. It has two earth wires weighing eight tons each. The whole 108 tons was too great a weight to be moved by crane, so it was jacked off and conveyed on a giant motor lorry with thirty-two rubber-tyred wheels to Lockfields.

The transformer, which is 22-ft. long, 9-ft. wide, and 12-ft. high, is 25 per cent. larger than any other transformers on the Grid system, and as a self-cooled unit is the largest transformer in the world.

Heavy Loads at Manchester.

During last month (December) the s.s. "Belpamela" loaded 8 locomotives and tenders for China and 13 locomotive boilers for Calcutta at the Manchester Docks. The locomotives are the first main-line locomotives ordered by the Chinese Purchasing

S.S. "Belpamela" loading fully-assembled locomotives for China at Manchester Docks.

Commission in London out of the Boxer Indemnity Fund, and have been purchased for the China National Railways for use on the Tientsin-Pukow Railway. The engines and tenders, which are being shipped fully assembled, have a combined weight of 146 tons and the locomotive boilers weigh 19 tons. The latter are for use on the East India Railway.

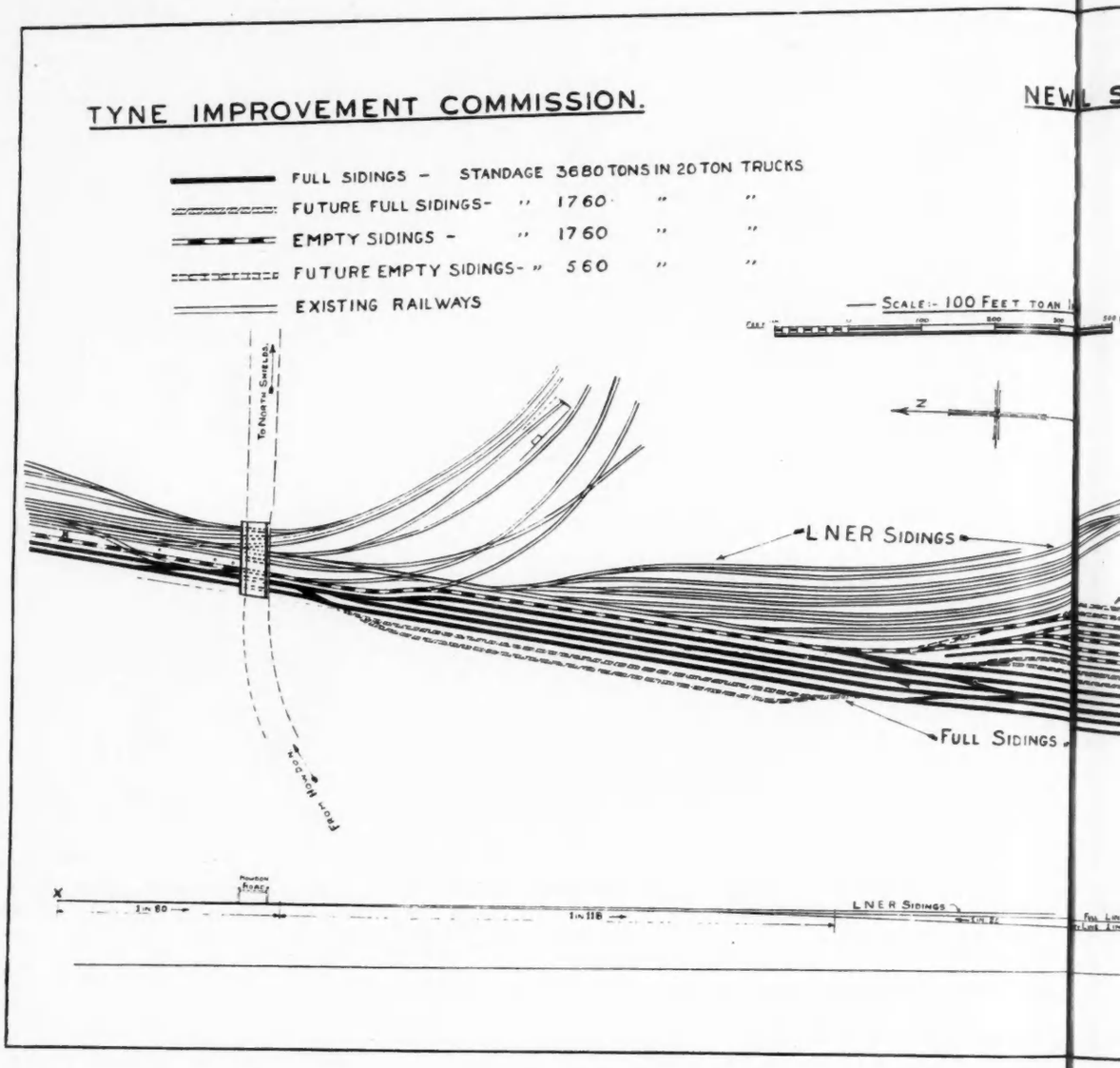
Centenary of Liverpool Dock.

This is the centenary year of the opening of Brunswick Dock, Liverpool. The first south-end dock constructed by Jesse Hartley, and covering, with the half-tide basin, about 15 acres, it was designed for the timber trade. It absorbed the site of Jackson's Dam (the old tide mill reservoirs) and land bought from the Corporation for £96,005. As the timber trade increased and additional room was required, Harrington Dock estate was bought in 1844. Later storage space was considered expensive as well as limited, and Canada Dock was constructed for the timber trade at the north end, being opened in 1859, with a water area of nearly eighteen acres, and the lineal quay space of 1,272 yards. But within 20 years the imports had grown so much that Brunswick Dock had recovered practically as much as had been transferred to the north end.

Sprung a Leak in Ship Canal.

An unusual incident took place in the Manchester Ship Canal a few days ago. A 1,200-ton steamer carrying timber from Latvia to Manchester was concluding the final part of her journey when she began to develop a list. She had left Eastham and was making her way along the Manchester Ship Canal towards Runcorn, when it was decided to tie up at the Western Mersey Lock to make an investigation. It was then discovered that one of the iron plates in the hull had become fractured, and water was entering the forward part of the ship. Part of her cargo was discharged and temporary repairs were put in hand. These were quickly carried out, and in a few hours the steamer was able to make her way to Manchester. There was no interference with traffic on the Canal.

Tyne Improvement Commission: N C



IN order to increase the facilities for the shipment of coal in that part of the River Tyne near Northumberland Dock, the Tyne Improvement Commission have constructed a new coal shipping staith comprising two berths for large vessels. The site of the staith is on the north bank of the river near the west, or up-river end of Northumberland Dock, about three-and-a-half miles from the harbour entrance. The staith will be used preferentially by the Hartley Main Collieries, Ltd., who are constructing the necessary standage sidings, but it will also be available for the shipment of coal from any other collieries.

The plant consists of two travelling shipping towers fed by belt conveyors from teeming hoppers into which incoming wagons discharge from the high level railway sidings. Provision has been made for a third travelling shipper to be installed between the two existing towers should future developments show this to be necessary.

Full standage accommodation is being provided for 3,680 tons of coal in 20-ton wagons, with a future possible extension to about 5,440 tons, while empty standage is provided for about 90 wagons, with a possible extension to about 120 wagons.

The full wagons gravitate to the discharging hoppers from the standage sidings and empty wagons gravitate away from the hopper into the empty standage sidings.

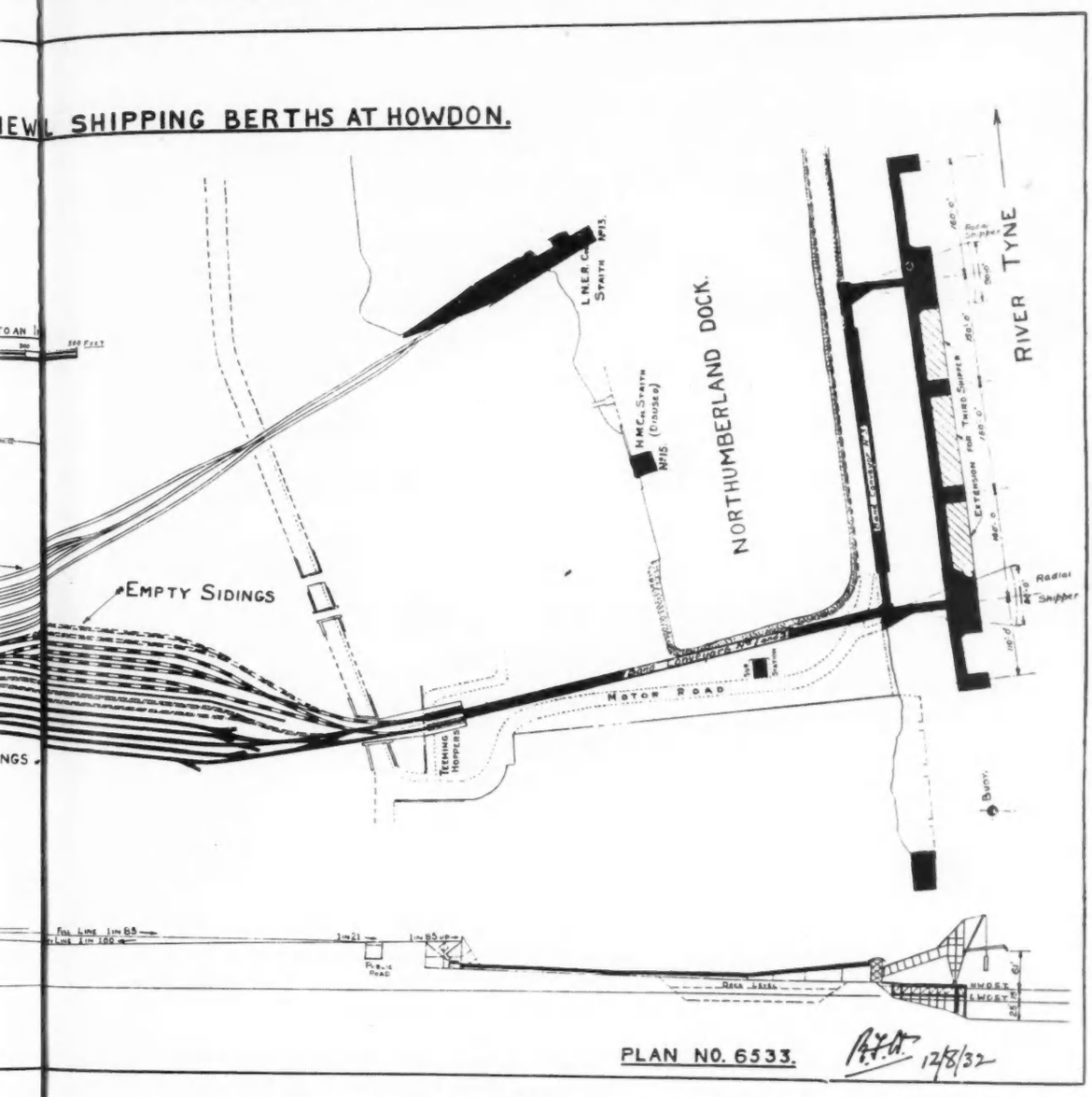
The full wagons discharge through bottom doors into two teeming hoppers from which the coal is fed by means of jigging feeders on to two 42-in. belt conveyors about 630-ft. long and running towards the river wall at approximately right angles. One belt feeds directly to the west shipping tower on the river front, while the other discharges on to a belt running parallel with the dock wall and feeding a similar tower situated 460-ft. to the east.

The jigging feeder at the outlet of each hopper is arranged so that when it is at rest the coal will be on the floor of the feeder. A regulating door is provided on the outlet of each hopper for controlling the discharge. The discharge is also regulated from the control cabin on the shipping tower through a variable speed motor driving the feeder. An emergency switch is fitted near each feeder so that the motors may be stopped at that point.

Conveyors Nos. 1 and 2 taking coal from the jig feeders are carried in one gallery on approximately level foundations to the Drive House, from which they rise at approximately one in ten to the Junction House. Here Conveyor No. 1 feeds directly on to the Boom Conveyor of the west shipping tower, and the coal from No. 2 Conveyor is diverted to No. 3 Conveyor, which runs to the east shipping tower along a gallery about 28-ft. 6-in. above the deck level.

The galleries housing the conveyors consist of light steel framework roofed and sheeted at the sides, and fitted with large steel framed windows. The belts are arranged with gangway spaces of 2-ft. 9-in. between the conveyors, and of 2-ft. 6-in. at each side. Provision is made in the gallery housing No. 3 Conveyor for a future conveyor belt and tripper running on the river side of the gallery in connection with the proposed third travelling shipper. The troughing idlers of the band conveyors are spaced at 4-ft. centres and are of the 5-pulley, ball-bearing type, arranged to trough the belt at 30 degs. Both the troughing and return idlers have 5-in. diameter pulleys and are fitted throughout with nipples for grease gun lubrication. Take-up screws are provided for the adjustment of each of the belts. The return run of the belt is protected from falling coal by means of light steel sheeting running the full length of the conveyor, and a chain-driven brush gear is fitted to the return run to remove all coal, etc., adhering to the belt.

N Coal Shipping Staith at Howdon



The coal is diverted through a right angle at each end of No. 3 Conveyor by means of radial, enclosed chutes designed to receive the coal without shock and to deliver it at approximately belt speed, so reducing breakage to a minimum.

The belts are made up of six uniform plies of 32-oz. duck, with a strength of 400 lbs. per inch width of warp and 210 lbs. per inch width of weft. The top cover is of rubber $\frac{3}{16}$-in. thick, while the bottom cover is $\frac{1}{16}$-in. rubber. The tensile strength of the rubber is 4,000 lbs. per sq. in. on the original cross-sectional area, with an elongation of at least 650 per cent.

The electric motor drive for the belts is through totally enclosed worm reduction gear, and the whole of the driving gear is of substantial design, machine-cut teeth being employed throughout, and all the main bearings being of the ball type. The motors are of the totally enclosed, slip-ring type, continuously rated, and capable of carrying 25 per cent. overload for two hours, or 100 per cent. overload momentarily.

The whole of the conveyor galleries, towers, etc., are electrically lighted, current being supplied at 110 volts for this purpose, and two large 1,000-watt weatherproof cargo clusters are provided at the ends of each loading boom. The control cabins are also electrically heated.

Each shipping tower, together with its associated conveyors, is capable of handling 500 tons of coal per hour, at a belt speed of 350-ft. per minute.

Each shipping tower is of lattice steelwork, carried on two four-wheeled bogies about 30-ft. apart, one bogie being power driven from the control house to provide the radial movement of 90-ft. The bogies run on special 112 lbs./yd. flat bottom rails, and are fitted with screw-down stoppers, the rails being built up at the ends with substantial plate and angle buffers. From each tower projects a sliding loading boom slung by wire ropes at the outer end, the inner end running on the bottom channels of the bridge connecting the tower to the pivot and by means of wire ropes from the top of the tower this boom may be raised or lowered to suit all sizes of vessels at all states of tide. The boom has a telescopic movement of 50-ft., being hauled out by means of the wire ropes from the head of the tower and receding by gravity. The radial bridge between each tower and the pivot carries a short conveyor at a higher level than, and feeding on to, the loading boom conveyor. Endless belts are provided for each of these conveyor systems, working over drums about 30-in. diameter, so arranged as to maintain the correct tension of the belt in all positions of the loading boom.

Coal is delivered into the anti-breaker, or when this is not in use, into the vessel alongside through a circular spout on the end of the boom conveyor, this spout being operated by a parallel motion arrangement so that it is maintained at the same angle regardless of the angle of the belt itself. A ball-bearing roller path is provided so that the spout may be rotated freely by hand through a complete circle.

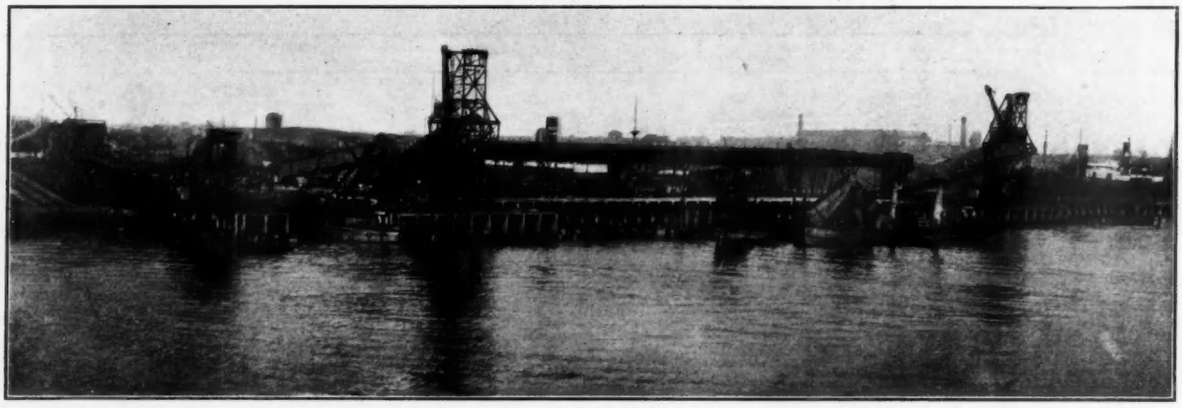
On each tower is erected an electrically controlled 12-ton jib crane for dealing with the anti-breaker and having separate motors and controllers for the hoisting, luffing and slewing motions.

Coal can be loaded at a maximum height of 61-ft. above high water spring tides and at a maximum distance of 55-ft. beyond the edge of the quay, or into small craft close alongside the quay. Power-driven Handcock Anti-breakers, 27-ft. between tumblers, are provided at each shipping tower, and all possible precautions are taken to prevent breakage of coal wherever transfer from one conveyor to another is necessary.

The whole of the plant is electrically driven, 3-phase, 50 cycle A.C. at 440 volts being taken from a sub-station on the site.

Emergency switches are placed at the teeming hoppers and

Tyne Improvement Commission—continued



The New Coal Shipping Staith at Howdon, constructed by the Tyne Improvement Commission.

at all points where the coal is transferred from one belt to another so that the plant may be stopped from any of these points. Once stopped, it cannot be re-started by the driver until the switch has been re-set. The controllers are capable of starting the plant against full load, and a sequence device is fitted to ensure that the motors can be started up and stopped in the correct order only. Telephonic communication is provided between the driver's cabin on each radial shipping tower and the teeming point where the wagons discharge into the hoppers, also between the two driving cabins. The whole plant is controlled from the cabin situated high up on the river side of each tower.

The radial tracks carrying the shipping towers are supported on concrete-filled steel cylinders sunk under compressed air to a rock foundation. The decking of the jetties is carried on 60-ft. ferro-concrete piles and protected on the river side by timber piling and fendering. Access to these dolphins from the dock wall is provided by means of timber-decked gangways carried on ferro-concrete piles, and a motor road has been constructed between the west end of the dock wall and the main road from Howdon to North Shields.

The staith has a river frontage of 740-ft., so that two vessels can be placed alongside and loaded simultaneously. Also, a tier of moorings 480-ft. long is provided at the east end of the staith for waiting vessels. The depth of dredging alongside the staith is 25-ft. at l.w.o.s.t., or 40-ft. at h.w.o.s.t.

Water mains have also been laid so that ships may be provided with fresh water and the necessary fire-extinguishing appliances supplied.

The scheme has been designed by Mr. R. F. Hindmarsh, M.Inst.C.E., Engineer-in-Chief to the Tyne Improvement Commission, in consultation with Mr. C. A. Nelson, M.I.M.E., Managing Director of the Hartley Main Collieries, Ltd., while the details of the reinforced concrete work have been prepared by L. G. Mouchel and Partners, Ltd. The contract for the foundations and jetties has been carried out by Brims and Co., Ltd., and the conveyor plant has been installed by Messrs. F. Turnbull and Co., both of Newcastle-upon-Tyne. The electrical portion of the equipment was manufactured by the British Thomson-Houston Co., Ltd. The necessary dredging has been carried out by the Tyne Improvement Commission.

The Port of New Orleans

The business of the Port of New Orleans continues to show encouraging improvement, according to figures compiled by the Dock Board.

During the month of October ocean-going vessels arriving had a total gross tonnage of 780,853 tons. This was an increase of 3,316 tons over October, 1931, and 27,948 tons over September of this year. There were 173 arrivals and 184 departures of ocean-going vessels during the month.

Vessels using the public wharves during the month totalled 721,595 tons, an increase of 43,693 tons over October, 1931, and 114,848 tons over September of the current year.

During the month there were 278,995 tons of cargo paying tollage, an increase of 5,024 tons over October, 1931, and 103,817 tons over September, 1932.

Notable increases were recorded during the month in many commodities moving over the port's modern wharves. Among the exports, textiles increased 35,978 tons and miscellaneous freight increased 1,470 tons. Among the imports, vegetable food products increased 15,604 tons, textiles increased 5,514 tons, miscellaneous freight increased 1,030 tons, animals and animal products increased 930 tons, and chemicals increased 661 tons.

The Dock Board's conveyors handled 943,095 bunches of bananas during the month. The Inner Harbour Navigation Canal was used during the month by 1,105 vessels having a total tonnage of 418,180 tons. There were 321 arrivals of inland watercraft of over 25 tons during the month. These vessels had a total tonnage of 118,147 tons.

Of the 173 sea-going vessels arriving during the month, 93 vessels having a total tonnage of 444,502 tons were under American registry. This represented more than 53 per cent. of the vessels and almost 57 per cent. of the tonnage.

Honduras was second in number of ships and also in tonnage; Norway was third in ships and Great Britain third in tonnage.

Following is a tabulation showing nationality, number of ships and total tonnage of sea-going vessels which arrived during the month:—

Nationality	No. of Vessels	Gross Tonnage
American	93	444,502
Belgian	1	5,086
British	11	71,571
Danish	3	8,280
Dutch	1	8,812
French	3	16,603
German	8	39,053
Honduran	25	77,646
Italian	4	23,434
Japanese	2	17,169
Norwegian	19	54,173
Spanish	1	6,632
Swedish	2	7,892
	173	780,853

Increased Grain Handling Facilities at St. John, New Brunswick

Grain handling facilities at West Saint John, New Brunswick, are to be extended by almost 100 per cent. by new installations recently authorised by the Dominion Government at an estimated cost of £200,000.

The new improvements include the doubling of belting on the conveyor system linking berths 5, 6, 7, 14 and 16 with the C.P.R. elevator and the installation of additional loaders at berths 5, 6, 7 and 16.

One million bushels of grain moved eastward for shipment through Saint John early in December, having already been purchased for shipment "*via* Saint John." Grain shipments are expected to be four or five times heavier than in December, 1931, when 443,853 bushels were moved through the port.

Heavy shipments of Scotch anthracite are reaching Saint John, these including a cargo of 6,000 tons at the end of November, whilst fully 50,000 tons are expected during the period of closed navigation on the St. Lawrence.

Altogether 29 extra liner sailings are scheduled for the coming season as compared with the figures last year.

The Harbour Pier of Verdon

By "CHALON" (Translated from the French)

A. Historical Survey

BORDEAUX, the ancient port dating from the time of the Bituriges, on the left bank of the Garonne, has gradually acquired a considerable importance and has become the great Metropolis of the South-West. Among our maritime ports Bordeaux takes rank, after Rouen and Marseilles, almost on an equality with Dunkirk and Le Havre, and has a registered tonnage of approximately 5 millions in imported and exported* merchandise; importation of coal and its corollary, the exportation of Landes mine posts, importation of petrol, cereals, ground nuts, phosphates, and pyrites, as well as the export of wines. Concentrated there, to mention only the leading elements, there is a great diversity of traffic which, during the last three quarters of a century, has necessitated a continuous extension of the harbour and also considerable improvements in its equipment. To this fact it is due that the accessible wharves cover a length of more than 11 km., with 221 cranes or other unloading apparatus of 1,500 kg. to 10 tons, thus representing an instantaneous hoisting power of 850 tons, without including 25 special engines, cranes on caterpillars, floating engines of 15 to 300 tons, etc.

As regards passenger traffic, the 34 navigation companies (12 French and 22 foreign) which have selected Bordeaux for their calling and departing harbour, have loaded or unloaded annually between 50,000 and 60,000 passengers from 1920 to 1930, as against 34,000 passengers in 1913.

In order to meet the constantly increasing requirements of the harbour it was not sufficient to improve the former quays or to create new ones and to modernise their equipment; it was also necessary to excavate the approach ways in such a manner as to adapt the foundations to the water drafts of vessels steadily becoming larger; but even with this problem solved (and it is still the aim of the remarkable dredging operations undertaken since 1925 in the Grande Passe de l'Ouest and in the Gironde) the navigation over the long distance was none the less impeded by the long stretch of 100 km. to be traversed from the sea up to Bordeaux.

It was therefore logical that, following the example of so many inland maritime ports, Bremen, Manchester, Rouen, etc., Bordeaux also came in time to be duplicated with an advance harbour, which forms, according to the expression of certain authors, " an Express Harbour " for the use of passengers and rapid mercantile services; it was necessary to allow the pier to have the advantages of a deep water draft and to avoid loss of time caused by a long river stretch. The programme of the eminent chief engineers who, since the beginning of the twentieth century have directed the destiny of Bordeaux Harbour, Messrs. Vidal, Glavel, Lefort, Levêque, has therefore tended towards the realisation of this scheme.

The Preliminary Plans.

A few cursory words on the history of this period will show what difficulties, both technical and financial, may be met with in the execution of such an undertaking.

As early as 1910, a preliminary plan was drawn up and the Chamber of Commerce of Bordeaux was, by a resolution dated February 23rd, 1914, declared the concessionnaire of an advance harbour with deep water to be erected at Verdon. This undertaking was declared to be one of public utility by a Law dated April 21st, 1914, which provided for a wharfage accessible on both its sides, along with a maritime station, unloading engines and a land station connected with the Verdon line. The financing was to be, for the major part, for the account of the Chamber of Commerce, with participation in the Orleans and Midi railway lines and the payment of a certain number of annuities by the General Council of the Gironde.

This undertaking, abandoned during the war, was revived in 1918, and a new subscription list was opened, contemplating a pier of 600 m. in length and accessible on the whole length of its seaward side and only on a part of its landward side with a minimum of 12.50 m. water at the base of its accessible parts; a two-way viaduct connecting it with the land.

From these initial undertakings, modified in succession so as to meet certain technical requirements, but above all to cope with the financial difficulties, there sprang from 1918 to 1925 a whole series of really kaleidoscopic projects, representing the efforts of the experts to reach the most favourable solution; these included Messrs. J. and G. Hersent more particularly, who interested themselves from the very commencement in the undertaking and whose preliminary plan was retained from among other tenders by the Chamber of Commerce, and who elaborated in succession more than ten solutions in their endeavours to satisfy the various requirements formulated.

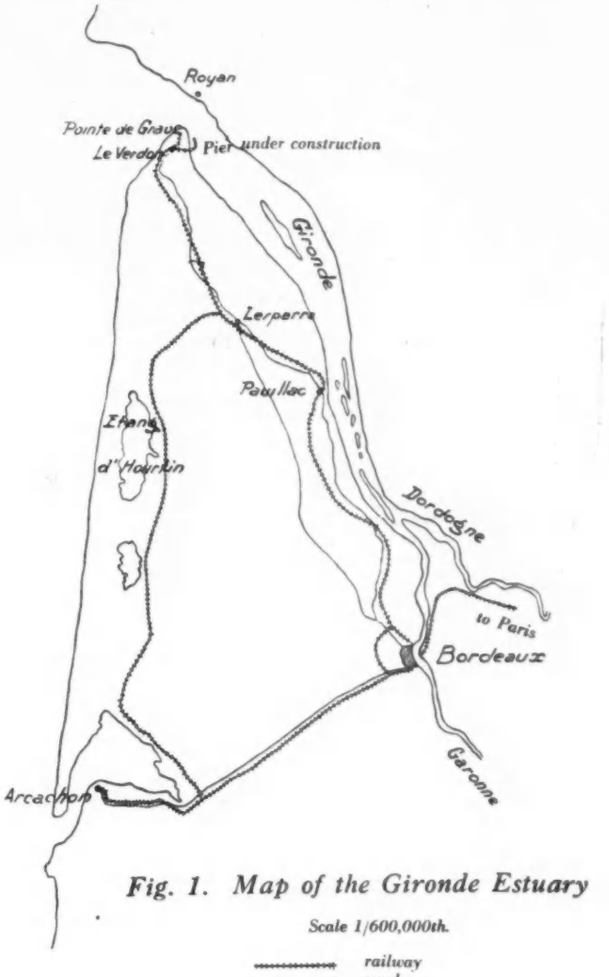


Fig. 1. Map of the Gironde Estuary

Scale 1/600,000th.

railway
road

The engineering work here in question is constituted by a reinforced concrete foundation which itself rests on reinforced concrete piles sunk at the side (—20). Each pillar consists of 72 piles 40 by 40. " Ducs d'Albe," bundles of piles in Oregon pine, were intended to buffer off the moorage (Fig. 2).

The original plan was modified by various other schemes intended principally to impart more inertia to the mooring structures. Thus the idea was suggested of a more massive pier consisting of an embankment between two solid walls; these walls made up of artificial blocks of 200 to 300 tons were to rest on a rock platform levelled at the side (—12.75).

With a less massive pier the idea of greater inertia in shock resistance was realised in 1920 by two other schemes in which the reinforced concrete foundation rests on piles in its axial zone, but at its lateral parts on metallic caissons, either seated on the dredged soil or sunk by compressed air. These plans then became the subject of negotiations between the Bordeaux Chamber of Commerce and the Société Anonyme Hersent and various technical points were discussed, more particularly as regards the question of the foundation, for which the continuous variations in the sub-soil gave rise to considerable uneasiness. At the same time, also, the administrative and financial questions had to be carefully considered, so as to provide for expenses, which steadily increased at this time, when prices were rising generally.

By a Law dated June 19th, 1923, sanction was given to a new project which provided for a Consortium between the Chamber of Commerce and the two railway lines interested to cover the

*In 1931: Rouen, 8,800,016 tons; Marseilles, 8,685,455 tons; Dunkirk, 4,781,461 tons; Le Havre, 4,506,048 tons; Bordeaux, 4,460,982 tons.
In 1931 Rouen and Bordeaux suffered a loss in traffic of 12 per cent. as compared with 1930, and far higher than that of other ports; in 1930 Bordeaux was ranked as third with 5,018,000 tons.
These figures do not, however, include the river traffic, which for Bordeaux amounts to roughly 1,500,000 tons.

The Harbour Pier of Verdon—continued

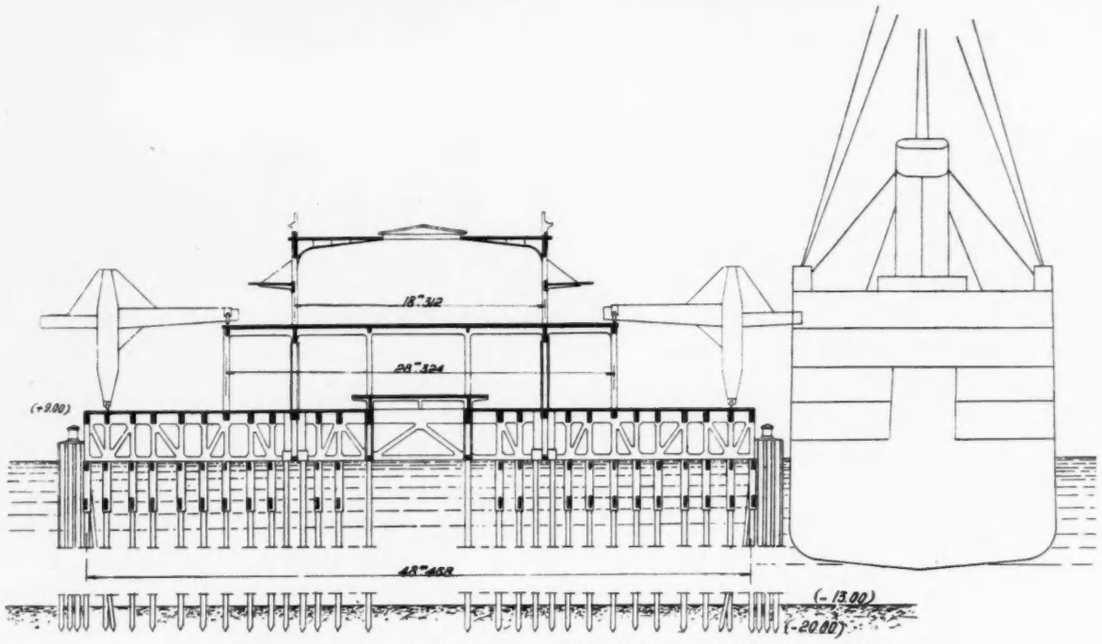


Fig. 2. Section of the Pier on Piles (Scheme of October, 1918).

new expenditure, which had risen to 30 millions, and of which the State defrayed a small part.

Hence it came about that certain features of the original plan were revived, more particularly the employment of supports less heavy than the caissons but more rigid than the isolated piles; hence arose the idea of pillars consisting of columns resting on groups of 4, 5, 6 piles (and even 10 and 12 piles), with, from spot to spot, massive moorings also on piles (Fig. 3), or alternatively of similar columns hollowed out at their base into a working chamber and sunk directly either by forcing or by compressed air.

Bottoming by Emulsion (Grouting).

This somewhat protracted evolution enables us to understand by what successive and tentative efforts the engineers were led to eliminate certain solutions and to advance step by step to the one which had to be adopted, namely, the principle of pile caissons combined with the idea of a special and economical system of bottoming proposed by M. Caquot, engineer-in-chief of bridges and roads. We are already familiar with the principle of the Jandin or Mammouth pumps in which a current of compressed air driven towards the base of a vertical channel submerged in water produces there an emulsion effect and a diminution of density while drawing the water from below upwards (Fig. 4). In this way there is produced an ascending current in the pipe and, having regard to the sandy nature of the subsoils known to exist at Verdon, M. Caquot hit on the idea of utilising the eddy caused by this ascending current, at the base of the pipe, so as to stir up the natural soil and draw its segregated particles into the aspiration currents.

This principle was very alluring and was finally adopted after experiments carried out by the Administration on two test piles in 1926.

The formulæ of obligations having been agreed to during the negotiations between the Port Autonome and the Société Anonyme Hersent, it was decided to have recourse to them for the execution of the undertaking, that is to say, it was under their auspices that they were undertaken in collaboration between the French Company and the Julius Berger Company of Berlin.

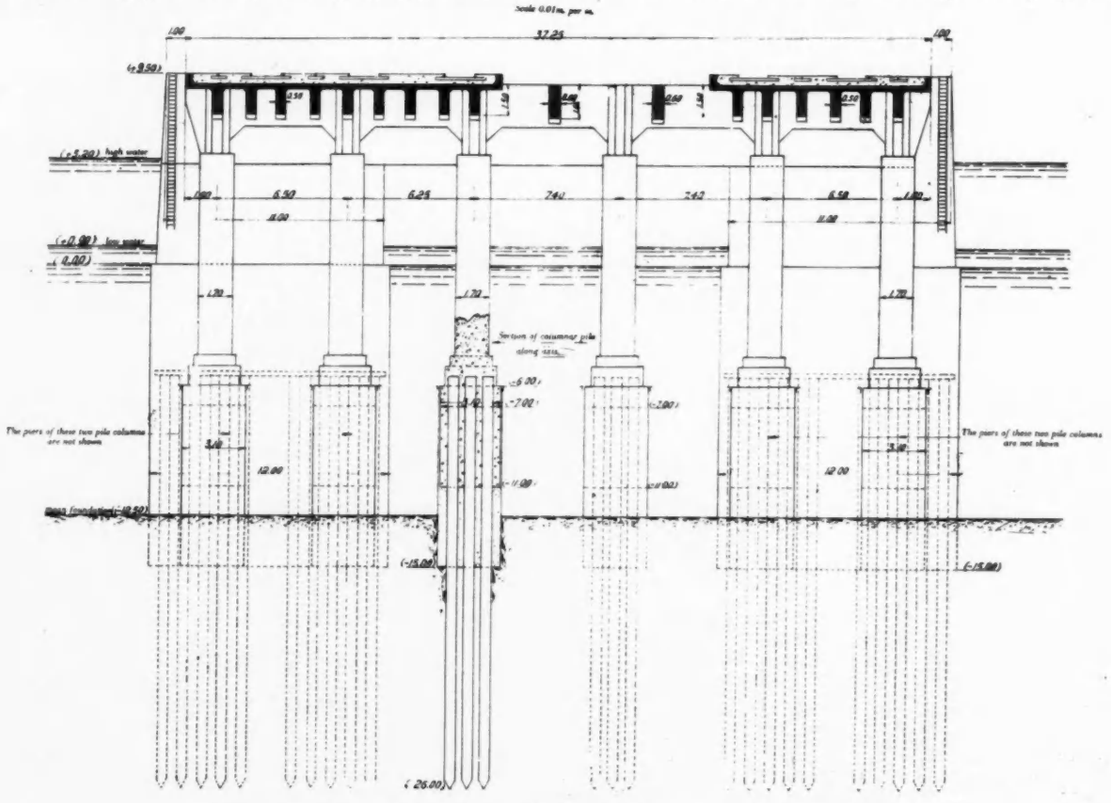
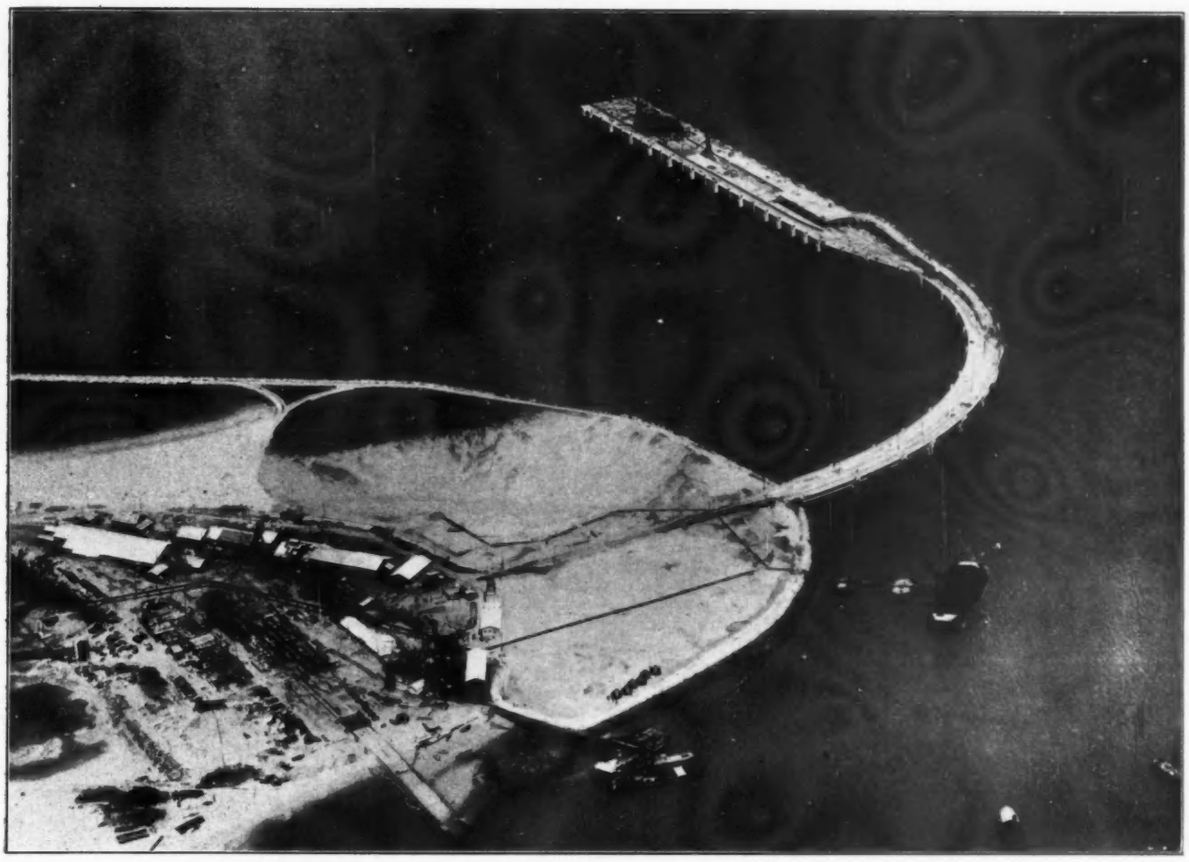


Fig. 3. Section of the Pier on Columns (Scheme of January, 1925).

The Harbour Pier of Verdon



Photo] *Aerial View of the New Pier at Verdon in course of Construction.* [Compagnie Aerienne Francaise

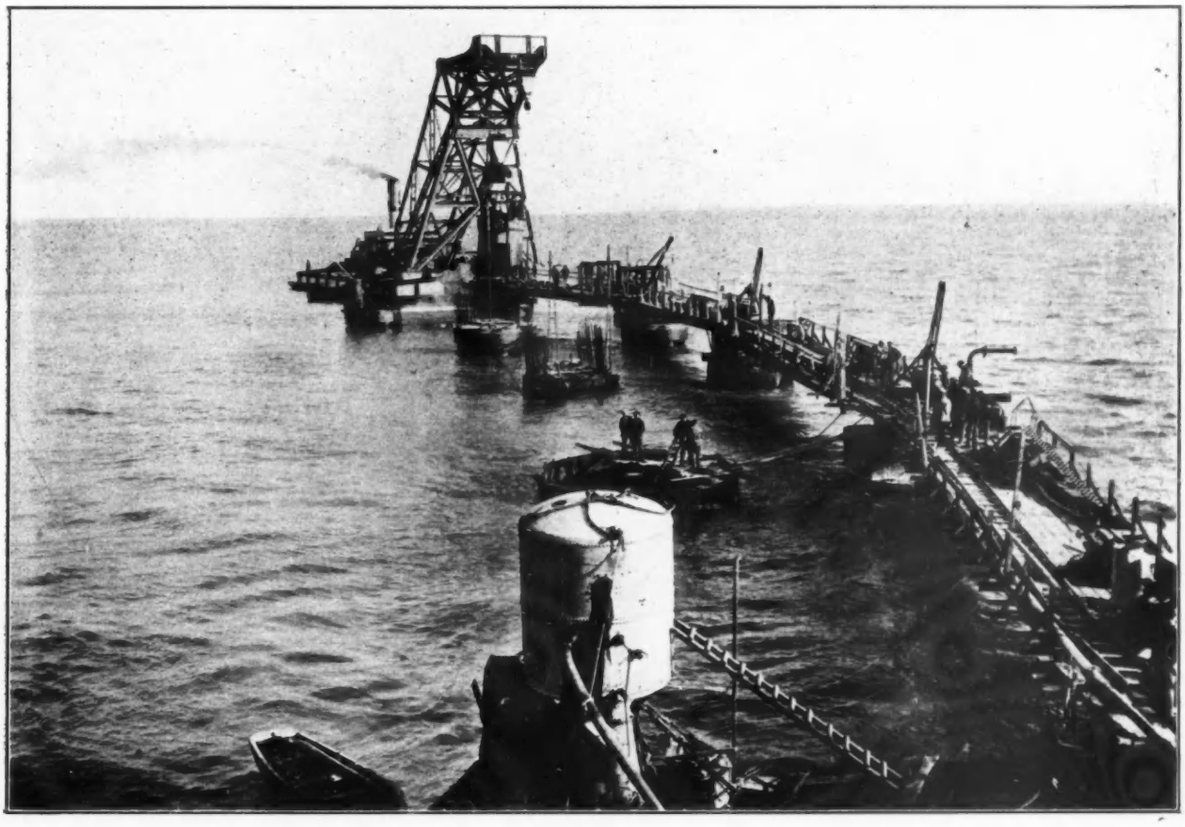


Plate E. Sinking Platform; on first level, righting of a pile by compressed air.

The Harbour Pier of Verdon—*continued*

After the period required to organise the platform (gantry), operations could be vigorously pursued from the spring of 1930, and according to present outlook they will be completed at an early date.

The history of the Verdon platform is, briefly speaking and to a great extent, that of the operation of bottoming by emulsion, which was brought to fruition by a happy collaboration between the Administration and the Enterprise.

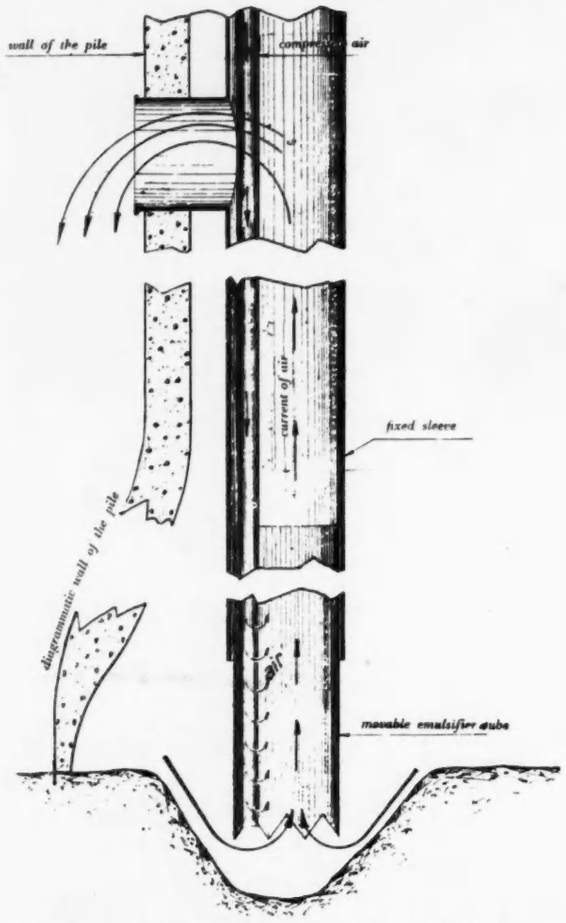


Fig. 4. Diagram showing the Operation of the Emulsifier Tubes.

B. Description of the Harbour Pier

Features of the Construction.

This structure comprises a pier of 317.50 metres in length and 38 metres in width resting on reinforced concrete piles and extending parallel to the navigation channel; it is connected with the land by a curved viaduct for approach which is 372 m. long and also rests on reinforced concrete piles.

This structure erected on the bank of the river measures about 4 km. from the point which separates the estuary from the sea, and is adequately protected in this way against ocean tempests. Owing to its situation it will be very little exposed to the ocean swell and the foundations on which it rests, which provide for 13 to 15 metres below low water or to allow access to the largest packet boat on either side of the pier and practically at every season. It will be equipped with a large maritime station, operating engine and, naturally, with iron roadways, which will enable passengers to change directly from railway carriage to packet boat. In order to relieve any congestion of stress, the platform of the pier will be reserved entirely for the iron ways and for cranes, while the service of the maritime station will be concentrated on the first landing; this perfectly scientific arrangement is specially interesting from the technical point of view, for the joining up of this landing with the approach viaduct has involved several serious propositions: approaches, carriage way, railway crossing, etc., which have necessitated the most minute and delicate consideration.

Technical Description.

The pier is divided lengthwise into five constituent parts of 60 m. (raised to 68 m. and to 69.50 m. for the two last), separated by a dilatation joint of 3 cm. (Figs. 5 and 6). Each of the three first elements is founded on four pillars spaced at 15 m. from axis to axis, and each of which comprises three piles spaced 15.15 m. from each other. The two latter elements are similar, but are based on five pillars. A constituent element (Fig. 6) thus consists specifically of a system of 3 or 4 solid trusses of 15 m. span, with at each extremity a bracket of 7.50 m.

The piles surmounted by stout capitals are braced crosswise by means of lintels formed by a double reinforced concrete beam of 0.65 m. thickness and 3.85 m. in height.

Each pillar constructed in this powerful way supports the superstructure, the framework of which comprises 3 cellular beams above the three sets of piles and 2 ordinary beams in the interaxial spaces (Fig. 7); all these beams have a height of 3.35 m. and thicknesses varying with the load to be supported.

The rough-walling itself has a thickness of 20, 40 and 60 cm., according to the load, and is, moreover, fortified by longitudinal beams intended to act as rolling-ways for the cranes.

The approach viaduct is constructed on similar lines, but is not so wide (17 m.) and rests on 2 sets of piles only (Fig. 8); furthermore, the loads being less heavy than on the pier, these piles could be spaced at greater distances, and the span of the trusses amounts to 28 m.; the viaduct, like the pier itself, is made up, with a view to allowing for dilatation of independent elements, each of which consists of a curvilinear beam with two solid trusses of approximately 28 m. span and two bearing brackets of roughly 10.50 m.

Lastly, the viaduct, in order to join up with the pier, widens out at its extremity from 17 to 38 m. in width and comprises, for this purpose, an element of trapezoidal form (Fig. 5), the complicated framework of which enables us to realise the transition between the system of simple beams used in the viaduct and that of the tubular beams employed in the pier.

C. Progress of the Operations: Positioning of the Piles

Construction of the Pile Columns.

Having now explained the general features of the construction, we proceed to a survey of the platform and to note one by one the successive stages of the work with the aid of several photographs, some of which have been taken by the Administra-

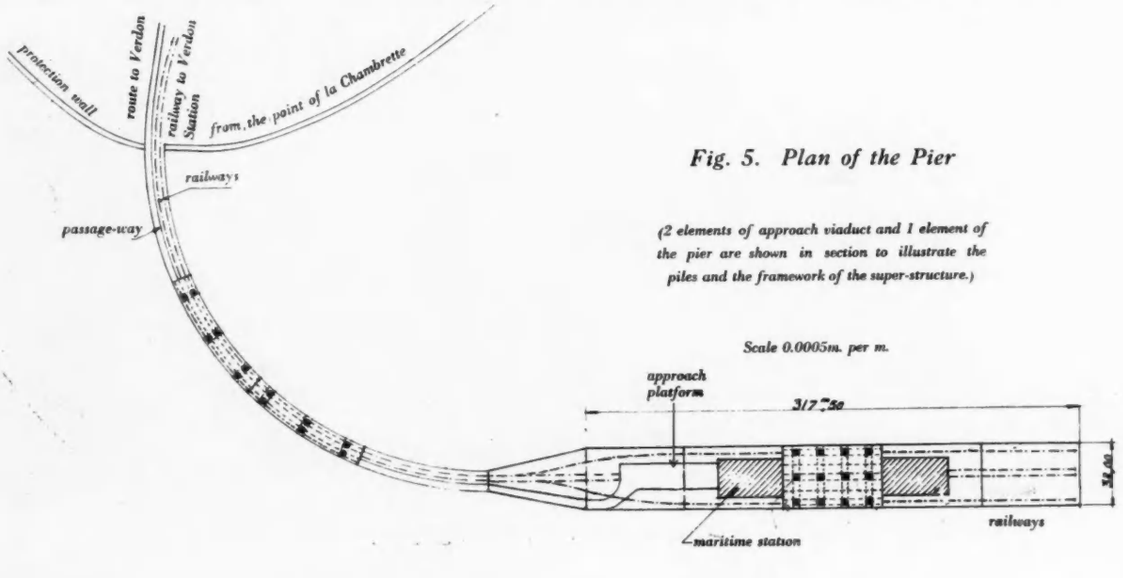


Fig. 5. Plan of the Pier

(2 elements of approach viaduct and 1 element of the pier are shown in section to illustrate the piles and the framework of the super-structure.)

Scale 0.0005m. per m.

The Harbour Pier of Verdon

Plate I. Launching a Pile: righting at landing site.

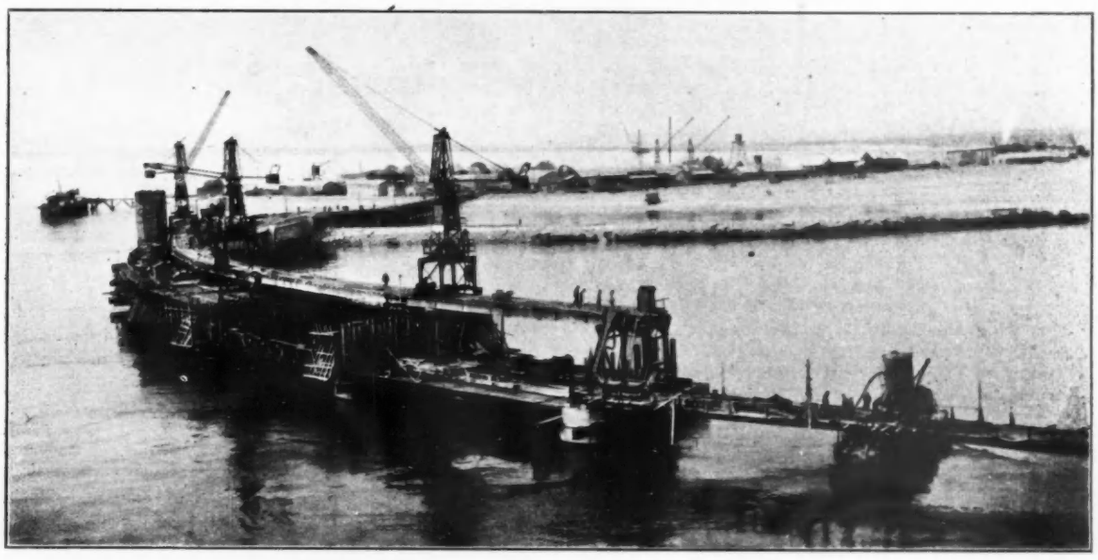


Plate L. Platform for Superstructure Erection.

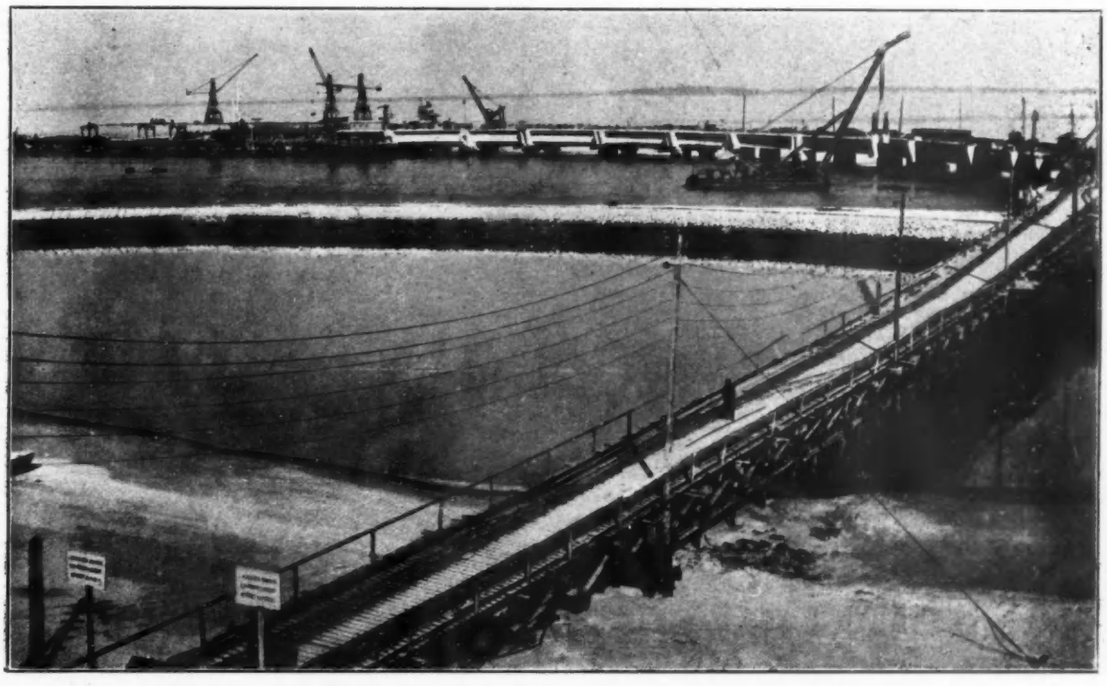


Plate X. General View of the Platform with the elevated approach runway.

The Harbour Pier of Verdon—continued

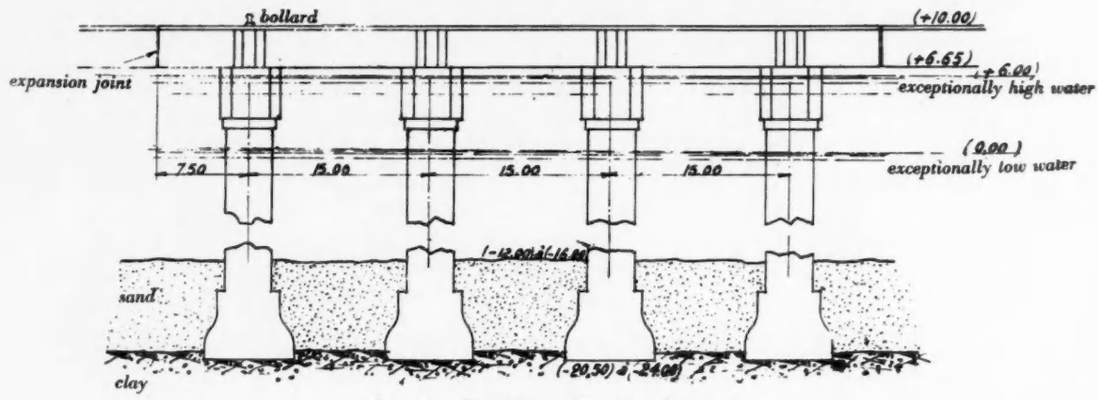


Fig. 6. Elevation of a Pier Element.

tion of the Port Autonome, who has kindly put them at our disposal and to whom I must tender my thanks for authorising me to use them.

The pile-columns, which are of reinforced concrete, were at first of 21.50 m. and then of 26.50 m. in total length; they consisted (Fig. 9) of a cylindrical shell of 4 m. external diameter and 0.15 m. thickness, strengthened by several reinforced parts to withstand the concentrated stresses to which the piles are exposed in the horizontal position, after the construction and during their first stages. This shell expands at its base into a working chamber, the outer diameter of which, at the level of the cutter, is 7.50 m.; this cutter is 10 cm. thick and is equipped with a metallic cutting blade of sheet steel, 25 mm. thick. In the first piles of 21.50 m. a circular opening of 1.10 m. in diameter was cut at the top of the working chamber to form the outlet of an axial metal chimney which ascended up to the head of the pile.*

The columns were constructed horizontally by means of metallic boxes (Plates A and B). For the concrete work aluminous cement was selected, the distribution being 350 kg. per cubic metre so as to ensure a perfect protection from the sea. Owing to the rapidity with which the operations were carried out and the extreme density of the ironwork (more than 39 tons of steel in a column of 108 cubic metres, or a percentage of 4.66), special precautions had to be taken in the reinforced concrete work; it was carried out in two stages, in the first of which the outer metallic boxings were placed only on the lower half-cylinder and the concrete was injected into the central section of the pile of only 15 cm. thickness. Compressed air vibrators ensured the descent and the perfect distribution of the concrete throughout the entire mass; thereafter the last metallic boxings were put in position, and these covered the upper half of the pile with the exception of a gap of about 1.50 m. in width, included between two generatrix lines and through which the concrete was inserted (Plate A); the final levelling of this gap was done by hand.

Judging by the tests made in times of excessive heat, the concrete thus manufactured has shown itself to be of excellent quality, and it is characterised more particularly by a perfect impermeability, which is still further enhanced by a coating of mineral or coal tar.

The various handling operations, the positioning and removal of the boxings, the laying of the iron, the feeding of the concrete were all done by means of a derrick and a portico crane which travelled on longitudinal ways on the heads and the covers of the piles respectively. Each stage of the concreting occupied only six hours, and the platform succeeded in constructing with great regularity 5 piles per month.

Construction and Bottoming of the Piles of 21.50 m.

In order to avoid, in handling of the piles, the use of special engines of very high power and taking a long time to construct, the first plan proposed was that they should be floated into position; to this end they were plugged at the base of their chimney by a circular stopper, and at their upper part by a large steel plate which would later form a closuring during the bottoming.

Thus converted into a watertight caisson, a pile, supported horizontally by a carriage, was led down on a shooting wedge to the level of the low waters; the succeeding high tide caused it to float, and it was then conducted to the grounding spot led in front by a tug and supported behind by a crane of 50 tons carrying power, which lightened the lower part of the pile so as to keep it in a horizontal position (without which the bell-cover, more heavy, produced in the position of natural equilibrium an inclination of roughly 70 degrees to the vertical); the crane itself was guided in turn by a second tug behind (Plate C). When the suitable position was reached the crane gradually released the bell-cover and the pile began to recover position. By the opening of a gateway the sea water was allowed to penetrate into the annular space comprised between the wall and the axial chimney of the pile, which when thus tested took up a vertical position and adjusted itself little by little so as to settle down on the natural ground (Plate D).

In this way the first stage of the bottoming was completed. To aid in this the piles were furnished with 3 channels of 27 cm. diameter arranged at angles of 120 degrees, secured to the inner wall and discharging into the ceiling of the working-room. Sliding within each of these channels or tubes another of 25 cm. diameter, the so-called emulser-tube forms a prolongation of 4.50—5 m., so as to join up in contact with the natural foundation, as is shown in Figs. 4 and 9. These tubes are equipped from the head of the pile by tubes of 5 cm. internal diameter, which serve at the same time for a supply of air compressed to 2.8 kg. From the floor of the bottoming the valves of pipes fed with compressed air from a channel proceeding from the ground are alternately opened; the water emulsionised by the compressed air rises in the fixed pipe, carrying with it the natural soil which is disintegrated and a powerful jet of greyish water, which is charged with mud, sand, and even gravel of certain dimensions, and the water is projected outwards at the same time as a slight sinking is effected. The pile is so high that

* It will be seen later that this chimney is no longer in existence in the piles of 26.50 m.

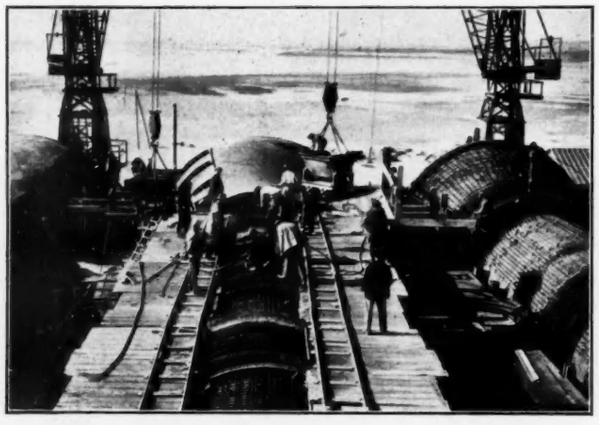


Plate A. Construction of Piles on Land: iron and concrete fillings.

Plate B. Yard for construction of Piles on Land.

The Harbour Pier of Verdon

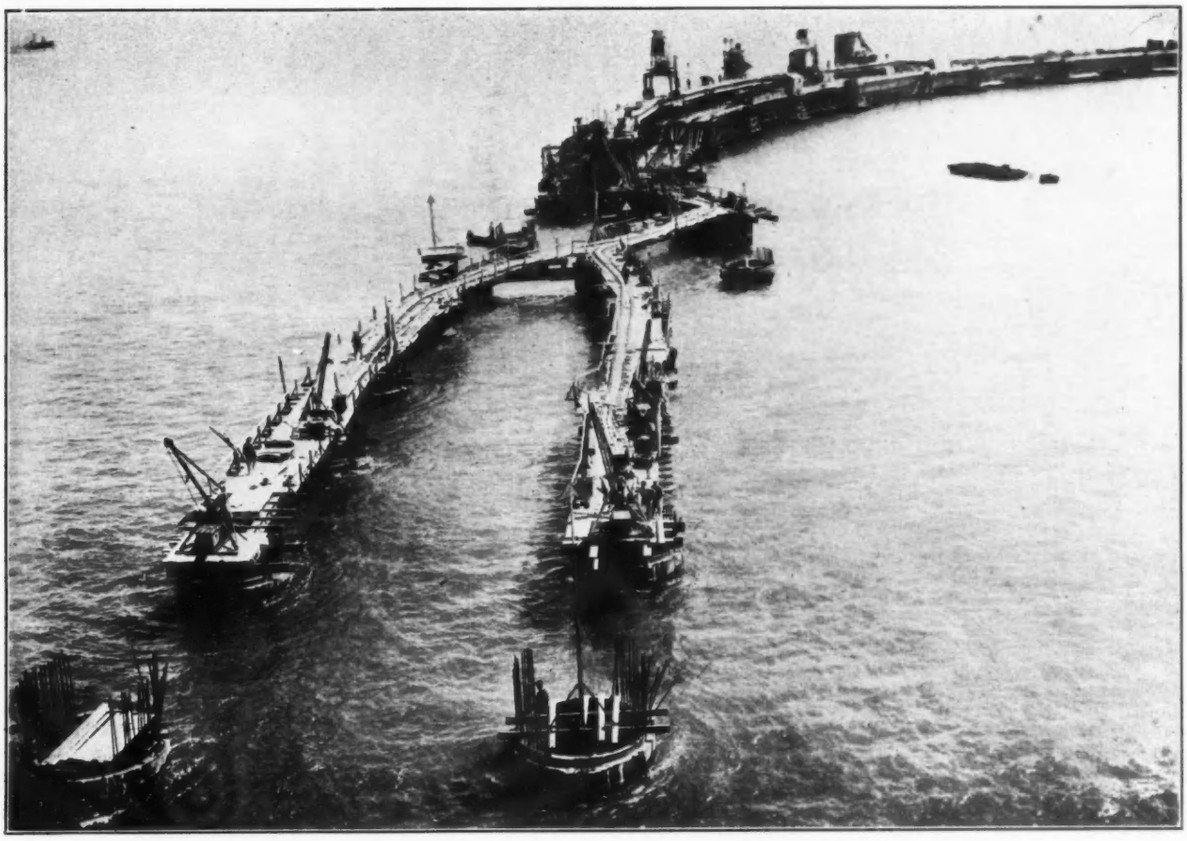


Plate M. Light Gangways for Pile Charging.

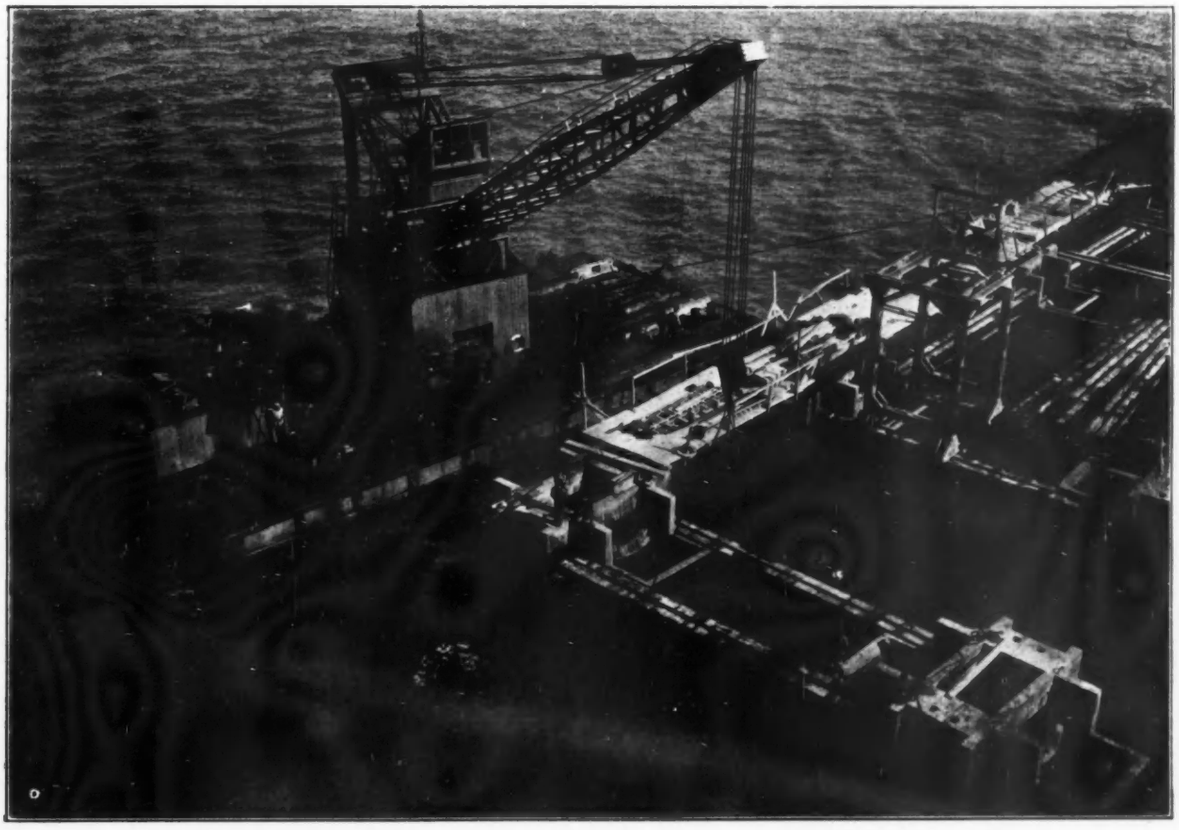
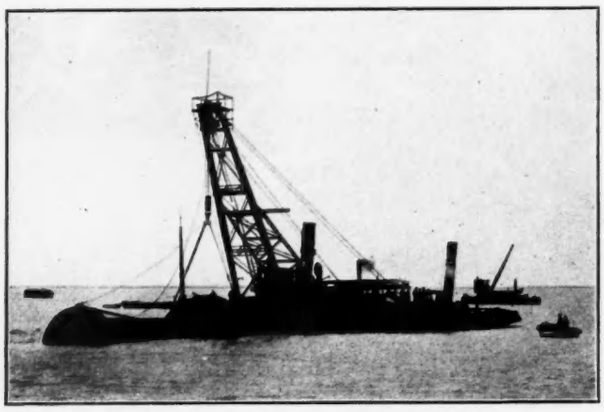
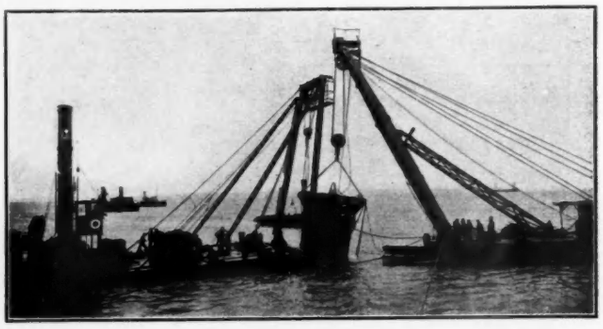


Plate Q. Placing Girders to support the Flooring.

The Harbour Pier of Verdon—continued



Photo] ***Plate C. Tug for Pile of 21.50 metres.*** [Port Autonome de Bordeaux



Photo] ***Plate D. Positioning of a Pile of 21.50 metres.*** [Port Autonome de Bordeaux

a slight inclination of it is inevitable and the necessity of limiting this inclination and at the same time of gradually diminishing the solid materials contained in the water in consequence of the stabilisation of the tubular cavity produced in the natural soil will prescribe the time for each emulser to act. The descent is thus produced by means of the adjustment of an instrument set on levelling screws on a tripod. It may be appropriate to add that with a view to preventing the vacuum set up in the working chamber by the suction of water from giving rise to back-wash and the deposition of sand under the cutter, a fourth tube in the former piles or an orifice in the new ones (Fig. 9) conveys into the bell-receiver a quantity of water equivalent to that which has been pumped.

This process, which looks so simple in theory, at first encountered great difficulties and demanded certain exceptional measures to be carried out. At the very beginning, in order to enable the natural soil to be broken up, it was considered necessary to impart a certain mobility to the emulsifying tube, which could be displaced vertically by means of a hoisting tackle fitted above the floor of the bottom in such a way as to enable it to spring back from the bottom of pipe; it had at the same time to receive certain rotation movements so as to avoid jamming. In this way, at the most favourable intervals the descent of the pile was accomplished at the speed of 7 to 10 cm. per hour, which was the speed considered probable at the beginning, though occasionally the work proceeded still more quickly. On the other hand, stoppages were frequent owing either to jammings in the emulser-tubes or to a complete absence of any extracted material. The waters then issued in a perfectly clear condition, and no further descending motion was registered, even though attempts were made to secure this by the action of two other emulsers. In such cases the only remedy was to send down a diver to explore the cause of the suspension, which might be a foreign body, a bit of wood, a piece of tramp iron or an encounter with a set of rollers too large to be dragged through, or again a piece of wreckage which had arrived under the cutter

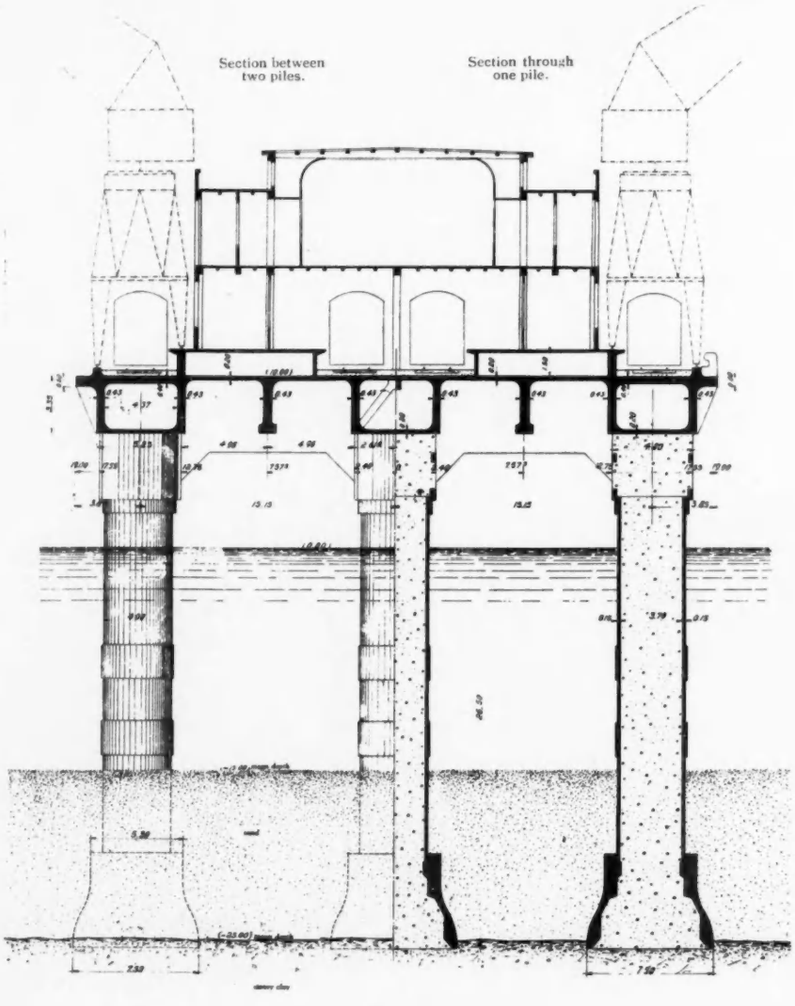


Fig. 7.

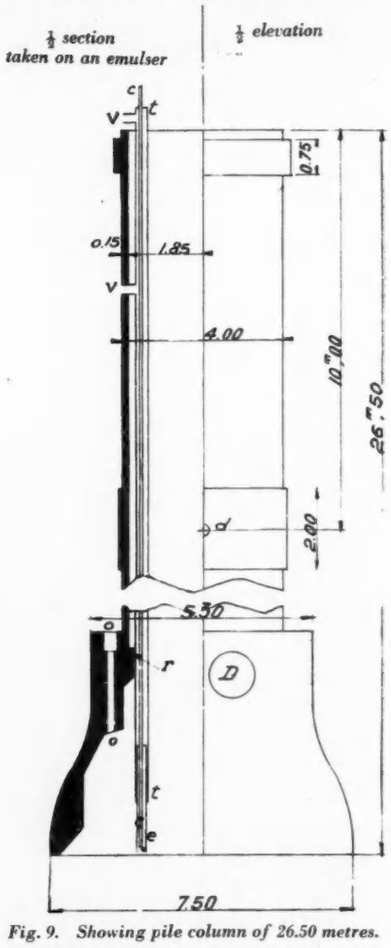


Fig. 9. Showing pile column of 26.50 metres.

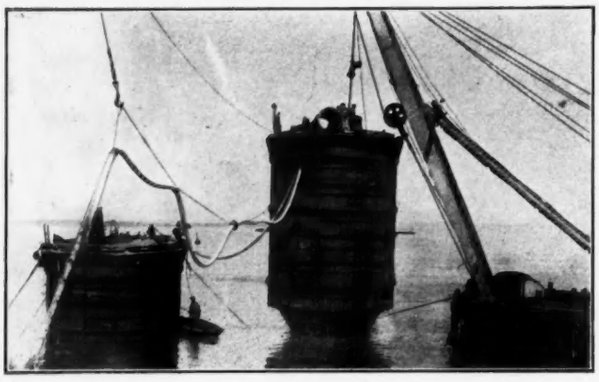
d. Passage aperture of suspension axis.
D. Timbering to carry the sling supporting the bell during the operation.
tt. Water suction pipe.
e. Movable emulsifier.
c. Hollow rod supporting emulsifier and the compound air conduit.
v. Apertures for water evacuation.
o. Aperture for influx of water into the bell.
r. Projection for possible fixing of a plug for compressed air working.

The Harbour Pier of Verdon

Plate S. Superstructure Platform at the beginning of the Breakwater.

Plate T. Iron and Concrete Equipment of Main Girders.

The Harbour Pier of Verdon—continued



Photo] *Plate F. Metal Coffer-dams on Piles of 21.50 metres.* [Port Autonome de Bordeaux

itself; each and any of these had then to be broken up by hand and brought to the surface in skips. For this reason the average hourly speed of a bottoming was appreciably lower.

Another drawback was occasioned by an inclination in the piles. After being dragged to the spot, and before being sunk, the pile which was still inadequately embedded in the soil was in a rather precarious position. It had to be securely propped by three stationary bodies, but in spite of this support the bad weather and occasionally the hetrogeneous nature of the soil met with often caused slidings of the cutter, which in general were successively rectified in the course of the operation, and which now do not leave any traces except by a slight displacement in the plane of the pile, a displacement which has sometimes amounted to 0.80 m. relatively to the standard.

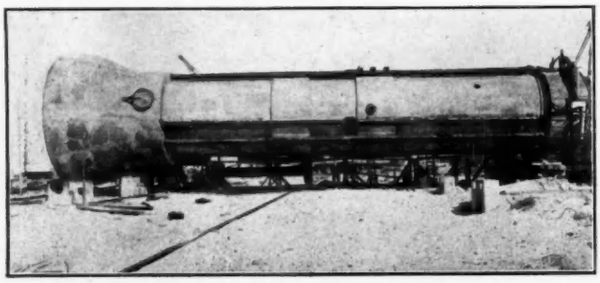
Use of Compressed Air.

Cases, however, might arise when the only means available for sinking did not allow of restoring a pile to position; thus one of them became embedded in the clay at an inclination of 7 per cent., which would have been extremely dangerous for the final stability of the completed work. It was then necessary —and indeed the only remedy—to restore the position by means of compressed air. The metallic chimney lent itself to this purpose after it was capped by a Fives-Lille sieve, and the bell chamber then became a chamber for working with compressed air after the pile had been ballasted in the annular space included between the chimney and the upper wall (Plate E).

The same proceeding was resorted to on another occasion in order to make up a foundation concrete. In both cases the success was complete, but such operations involve a considerable loss of time, not merely in the sinking of the pile itself, but, generally speaking, in the progress of the platform, which had its advancement arrested by the non-completed pile. It is important, therefore, to consider that the possibility of transforming piles into compressed air caissons is only a guarantee of security, which it is advisable not to resort to too frequently.

Use of Metal Dams.

But let us return to the normal sinking supposed to be carried out under satisfactory conditions. The foundation depth being understood to vary between —21.00 and —24.00, it was easy to arrive, with piles of 21.50 m., at the depth for which the pile recovered at high water. It was then necessary to remedy this by capping it with a metal dam of about 6 m. in height, the lower hoop of which was fixed on the upper section of the pile by bolts. The floor on which the sinking equipment was situated could then be raised 6 m. higher, and the operation was completed as far as the embedding in compact clay was concerned (Plate F). But the positioning of a dam of about 30 tons (Plate G) was a risky operation, because the only available means of securing it on the head of the pile was practically by a ring of bolts.



Photo] [Port Autonome de Bordeaux

Plate H. Piles of 26.50 metres, finished and ready to be mounted on the carriage for launching.

But a more difficult point still was to ensure the perfect tightness of this joint, which was done by means of plated fabric, wooden wedges and cement, but the resistance which it offered to the violent horizontal stresses to which the cap was subjected when violent tempests occurred was very feeble; in other cases it was necessary to maintain it in position for a sufficiently long time, that is to say, till the concrete work built in the inside had reached the level (5.50) which would allow of the final execution of the superstructure above the water. The final removal of the dam was also not effected without difficulty, because the extraction of the rusty and distorted bolts, which had to be done under the water by divers, was a protracted and sometimes dangerous operation.

Lastly, these stoppages in connection with the dams had often their repercussions on the whole progress of the platform, which thus suffered serious delays.

Principle of the Adoption of Piles of 26.50 m.

Experimental trials soon pointed to the desirability of various improvements in the original process, the principle of which was recognised to be perfectly satisfactory, although, in view of its novelty, it necessitated certain practical expedients in the methods of its application.

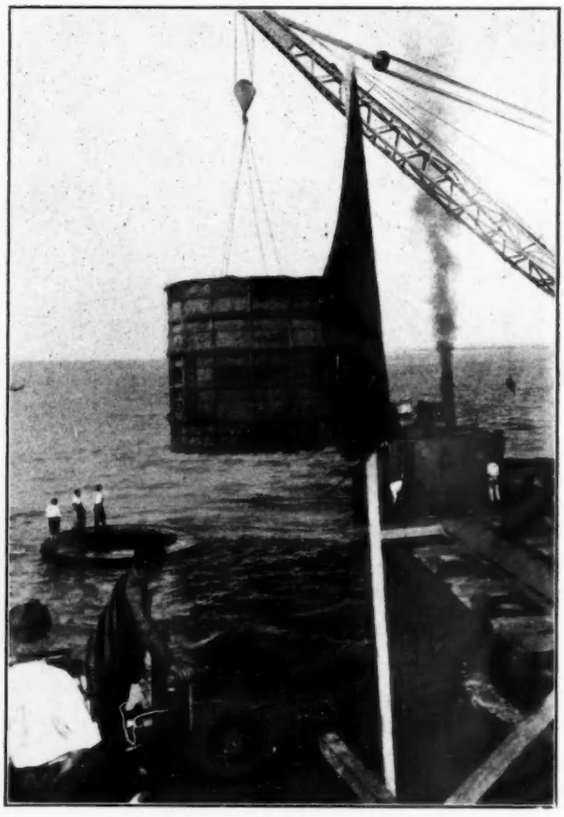


Plate G. Fitting on of a Metal Coffer-dam.

The fundamental improvement consisted in making the piles sufficiently long to render the dam superfluous. It then became necessary deliberately to select far less heavy columns and, dispensing with the too cumbrous process of flotation transport, to make use of a very substantial raft-beam capable of carrying these heavy masses. The Enterprise, in close association with the Administration, gave a minute and careful study to the new arrangements which led up to the admission of piles of 26.50 m. in length and weighing approximately 290 tons and to have a floating crane of 300 tons specially adapted to the requirements of the platform constructed by the Chantiers Gusto of Schiedam.

Floating Crane of 300 tons.

This highly modern plant shown in Plate I, and of which the Port Autonome of Bordeaux has acquired the proprietary rights in view of the services it is capable of rendering later in the exploitation and the operations of the harbour, is 41 m. long and 18.10 m. wide. The steel hull, which averages 3.55 m. in its hollow part, is divided by two longitudinal and four transverse partitions into fifteen watertight compartments, some of which are loaded with stationary and liquid ballast. The water draught, which averages 1.40 m., reaches in the front part 3.20 m. when loaded.

The grab consists of a powerful trellised joist strongly windbraced and shouldered on its upper part by a second joist, also well latticed, which operates by compression.

The Harbour Pier of Verdon—continued

The extremity of the gib is equipped with two hoisting blocks calculated to carry 225 tons each; the two tackle blocks may operate simultaneously, and the power of the engine is then determined so as to lift a total of 300 tons. The height of the lift is 25 m., and the speed of working approximately 0.90 m. per minute.

The winches of the two blocks, operated by a steam engine, may be united by a friction coupling. Thus the two winches may act either coupled or each singly, and may also act in the reverse direction, the one being blocked on the shaft, while the other is regulated by a brake during the descent. In this way the utmost flexibility of motion is attained.

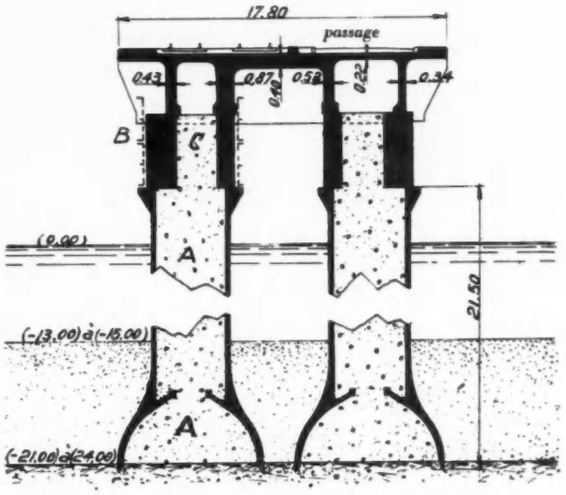


Fig. 8. Transverse section of the viaduct.

B, Metal dam in the interior of which the packing A of the pile has been done and the construction of the capital C, and which has been subsequently removed to build the superstructure.

Lastly, the floating crane is equipped with a dynamo which supplies it with electric current and with two compressors to provide the compressed air necessary for the sinking of the pile, and without it being requisite to connect the latter to the compressed air distribution system of the yard.

The employment of piles of 26.50 m. and their handling with the floating crane of 300 tons have conduced to great flexibility in carrying out the operations. Some estimate of this may be formed, for example, from the fact that, as against 11 pile-columns of 21.50 m. launched between April 10th and July 12th, 1930, after the inevitable tentative efforts with the first piles put into position in 1929, sixty piles of 26.50 m. were launched between October 16th, 1930, the date of bringing the new crane into service, and November 20th, 1931.*

It has even been possible during a month when the weather was exceptionally favourable to launch and position nine piles, a rate, however, which ought not to be considered normal.

Construction of Piles of 26.50 m.

The method of constructing the new piles is, generally speaking, the same as that for the older ones. The bell is of a type somewhat different (Fig. 9 and Plate H); more specifically it is very sensitively weighted, which improves the stability after landing of the pile. The axial metallic chimney is suppressed, and the roof of the working chamber is open over the whole internal circular section of the pile, with the exception of a small projection which enables a plug for compressed air working to be received. This wide opening of the bell is particularly useful for giving access either to the divers or to the concrete skips.

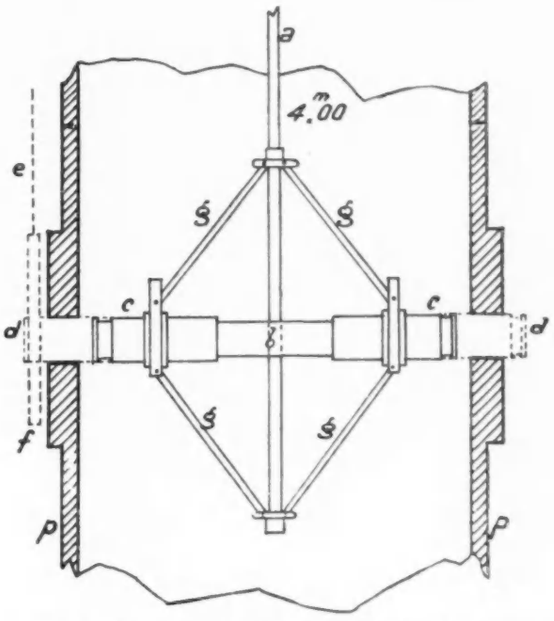


Fig. 10. Telescopic axis of suspension of the pile columns of 26.50 metres.

a. Endless screw spindle operated from head of pile.
b. Stationary sleeve.
gg. Jointed arms.
cc. Movable trunnions.
dd. Trunnions in operative position, suspensions by the shells f and cable e.
pp. Walls of the pile-column.

Launching of the Piles of 26.50 m.

The column is, as formerly, let down on its carriage to the foot of the hold; it is there slung and suspended to two gears of the floating crane, one of which seizes by means of a connecting bar the two extremities of a suspension axis passing through the pile towards its upper third section, while the other sustains the bell. It is thus transported horizontally up to the landing site where the second gear block, releasing it gradually, allows it to rotate about its own axis till it recovers the vertical position (Plate I). The pile, once in a vertical position, is further supported by only one block and tackle; this is what explains the power of 225 tons imparted to each (the apparent weight of the pile when partially immersed falling to 200 tons), so that the total load does not exceed 300 tons. The subsequent operations of lifting and entering which may be necessary to secure the correct planting in the ground are, under these conditions, very easily executed.

Sinking of the Piles of 26.50 m.

The sinking begins immediately (Plate J) and may be carried on without interruption (save for a stoppage of a few hours at the moment of high water following an attempt to launch in running waters which was abandoned owing to the serious drawback of the currents); in average waters the piles, if the bed of clay is above the figure —22.00, are not covered at high water.

The employment of piles of 26.50 m. has enabled the dangers of sinking to be appreciably decreased:—

1. The heavier piles adapted themselves more easily to the lowering movement.

* The last of the ninety-six piles was launched on April 27th, 1932.

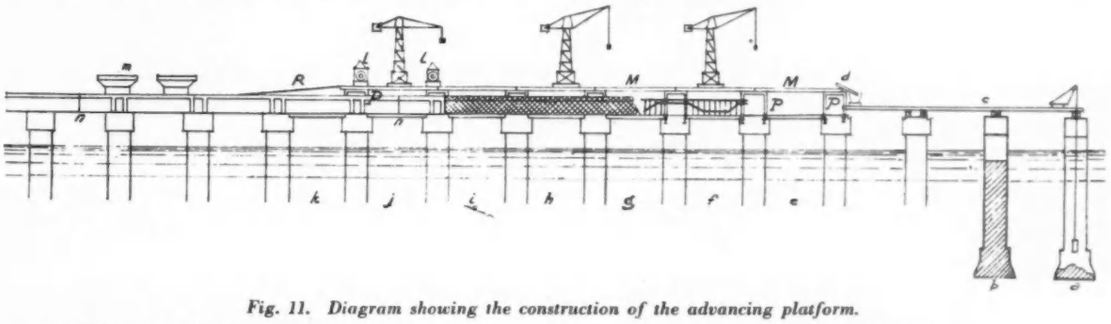


Fig. 11. Diagram showing the construction of the advancing platform.

a. Pile during packing of bell (submerged concrete).
b. Pile when barrel is being packed (dry concrete).
c. Light service gangways.
d. Channel for descent of concrete.
e. Joist when being timbered.
f. Joist when being fitted with iron.
P.P. Movable pylons.
M.M. Movable gangways for the erection.
R. Movable inclined way towards gangways.
S. Joist when being timbered.
h.i. Joists being fitted with iron.
j.k. Completed joists prior to removal of boxings.
l.l. Concrete machines
m. Platform for construction of the capitals which will later be carried on the piles.
n.n. Dilatation joints.

The Harbour Pier of Verdon—continued

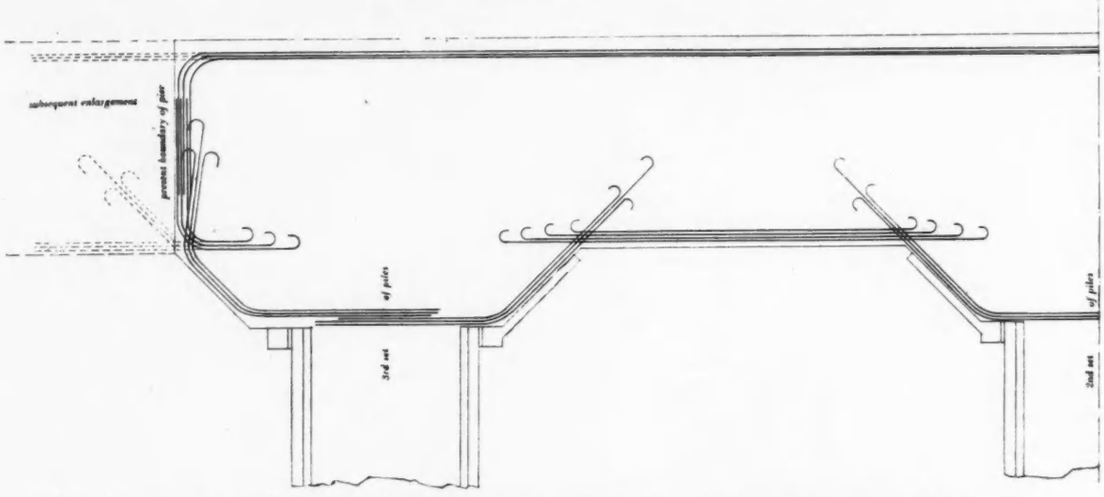


Fig. 13. Layout of Transverse Bracings so as to allow of a subsequent Enlargement of the Pier.

2. The vertical section of the wall of the bell showed a larger cutting angle, which lessened the facility of descent into soil which was rather compact, but, on the other hand, presented fewer risks of unsymmetrical sinking in a loose soil.

3. By avoiding all the delays of double sinking necessitated by the addition of a coffer-dam, this operation was appreciably accelerated and was therefore less exposed to the horizontal effects of storms.

4. It ought to be mentioned that on moving away from the river far fewer wreckages were met with. The number of stoppages and of interventions by the diver could therefore be greatly reduced, and the sinking speed was so far increased as to reach, in the most favourable cases, 1 metre per hour and even more.

5. Lastly, the installation of compressors on the 300-tons floating crane has enabled the sinking to be carried on in complete independence of the land yard, and consequently, by taking advantage of times favourable to making a certain progress, has ensured for the superstructure platform a progress which has been unbroken.

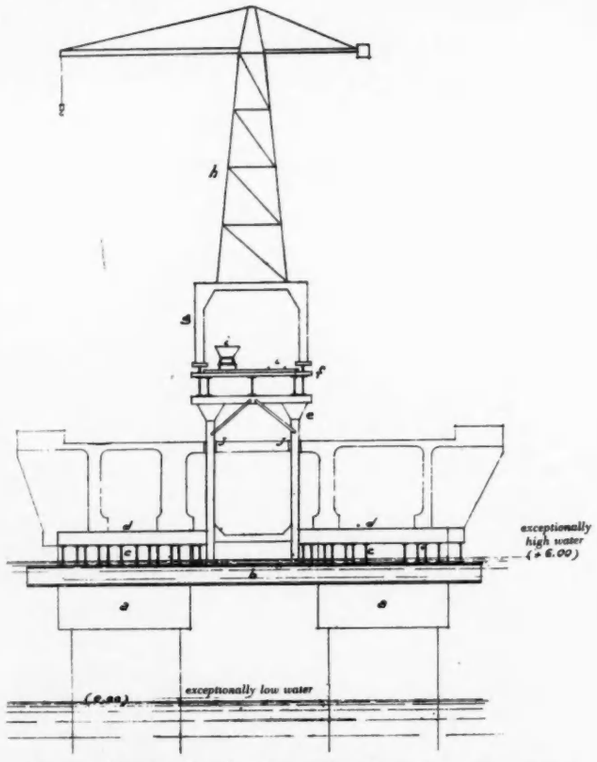


Fig. 12. Showing details of provisional erection. Transverse section.

aa. Reinforced concrete capitals encasing the piles.
b. Grey iron bearing-plates (one in front and one behind the piles).
cc. Grey iron stanchions supporting the boxings.
dd. Floor of boxings.
e. Metal pylon.
f. Upper manœuvring gangway.
g. Crane-bridge.
h. Travelling crane.
i. Decauville way.
j.j. Apertures retained in the walling during the construction for the removal of the pylon.

This, however, does not imply that no special precautions were unnecessary either in the operation of launching or that of sinking.

Suspension Axis of the Pile Columns.

The suspension axis was a delicate organ, destined to play a most important rôle in both the launchings and the sinkings, for it had to withstand considerable stresses, while at the same time permitting flexible, simple and rapid manipulations.

It would have been possible (and this was the first suggestion) to make use of a rotary axle of reinforced concrete forming part of the body of the pile; this idea was abandoned because of a dread of the considerable secondary stresses and the difficulties in ensuring the rotation movement. The next idea entertained was that of a movable axle passing diametrically through the pile in which, for this purpose, there were provided a substantially strengthened reinforcement and two circular openings of 28 cm. diameter each fitted with a bearing. After some preliminary and unsuccessful efforts a telescopic axle was installed consisting of a sleeve within which the two rotary axles can slide by a screw drive operated from the head of the sinking floor (Fig. 10).

The sleeve, with the rotary axles completely removed, may then be inserted horizontally into the pile when being prepared on land. The axles are then detached and penetrate, with slight friction, into the bearings passing through the wall of the pile. It is these which then seize, at the moment of launching, by means of two eyelets of cast steel, the slings of the connecting bar of the floating crane. After landing and sinking, when the pile requires no longer to be supported, they may, by a reverse motion, be liberated within the sleeve, which may then be withdrawn from the pile and used again for another equipment.

The use of nickel-chrome steel of very great resistance has finally enabled the end in view to be realised with perfect security and a high degree of flexibility.

Arrangement of the Emulser Tubes.

The emulsion also has given rise to a number of special precautions. The idea was entertained of obtaining, in the piles of 26.50 m., an improvement in the sinking as regards the following particulars:—

1. Distribution of the emulsers into groups of two, their section being determined at the lower part, not by a plane perpendicular to the axis, but by an oblique plane including the two discharge openings facing each other. In this way it was hoped by conducting the water through one of the tubes and utilising the other for the emulsion, to direct and consequently to increase the power of the water current which is drawn up by suction. It was further anticipated that, when any obstruction of the emulser tube occurred, there would be more favourable chances of removing such obstruction by reversing the direction of the current, that is to say, by employing the emulser tube for the passage of the water and conversely.

In point of fact this arrangement, which was tried on the first piles, did not yield the results expected; it even became obvious that the localisation of the suction current was rather hindered thereby, and that the employment of a conical pipe was more advantageous for the sinking. Thus recourse was again had to emulser tubes having a horizontal but indented opening so as to facilitate the disintegration of soil during the rising and falling movements of the tube.

2. As regards the emulser tubes nearer the cutter. In the first piles the three tubes were secured to the inner wall of the column; the centres of the discharge apertures into the natural

The Harbour Pier of Verdon

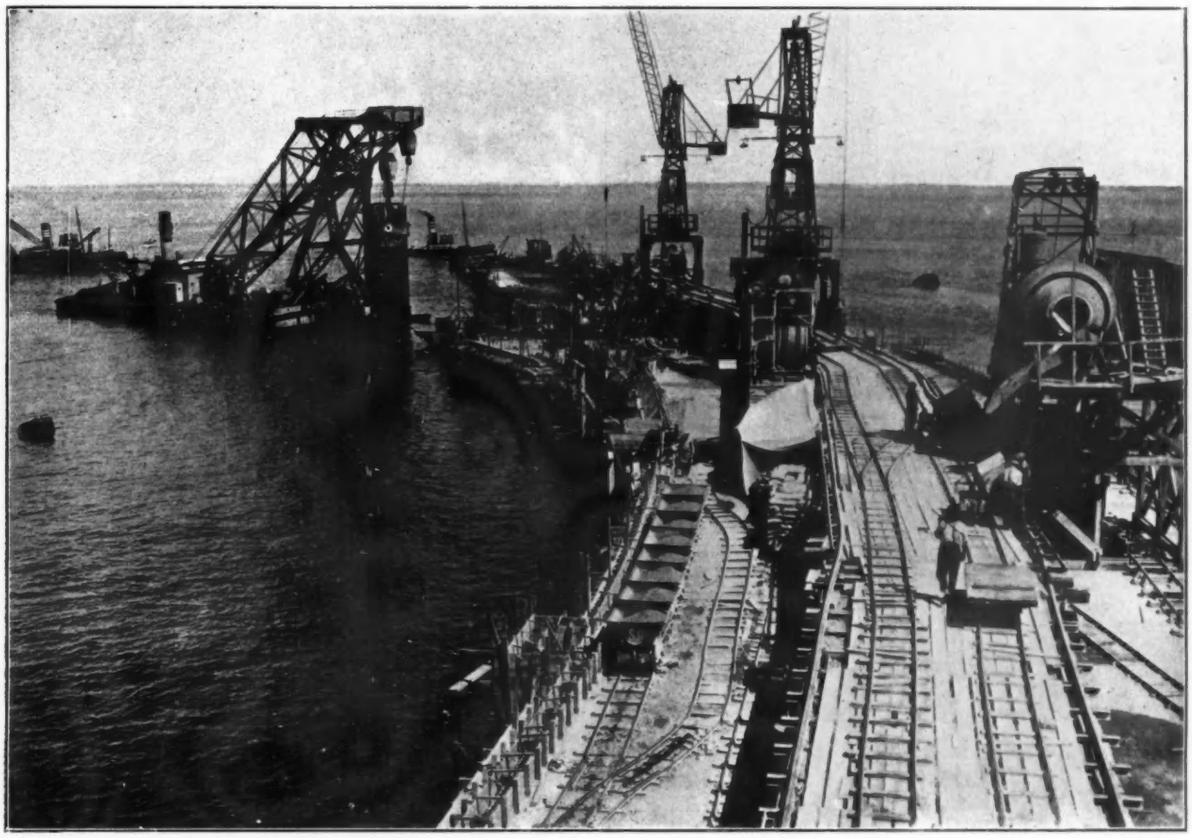


Plate U. Organisation of Concreting Platform.

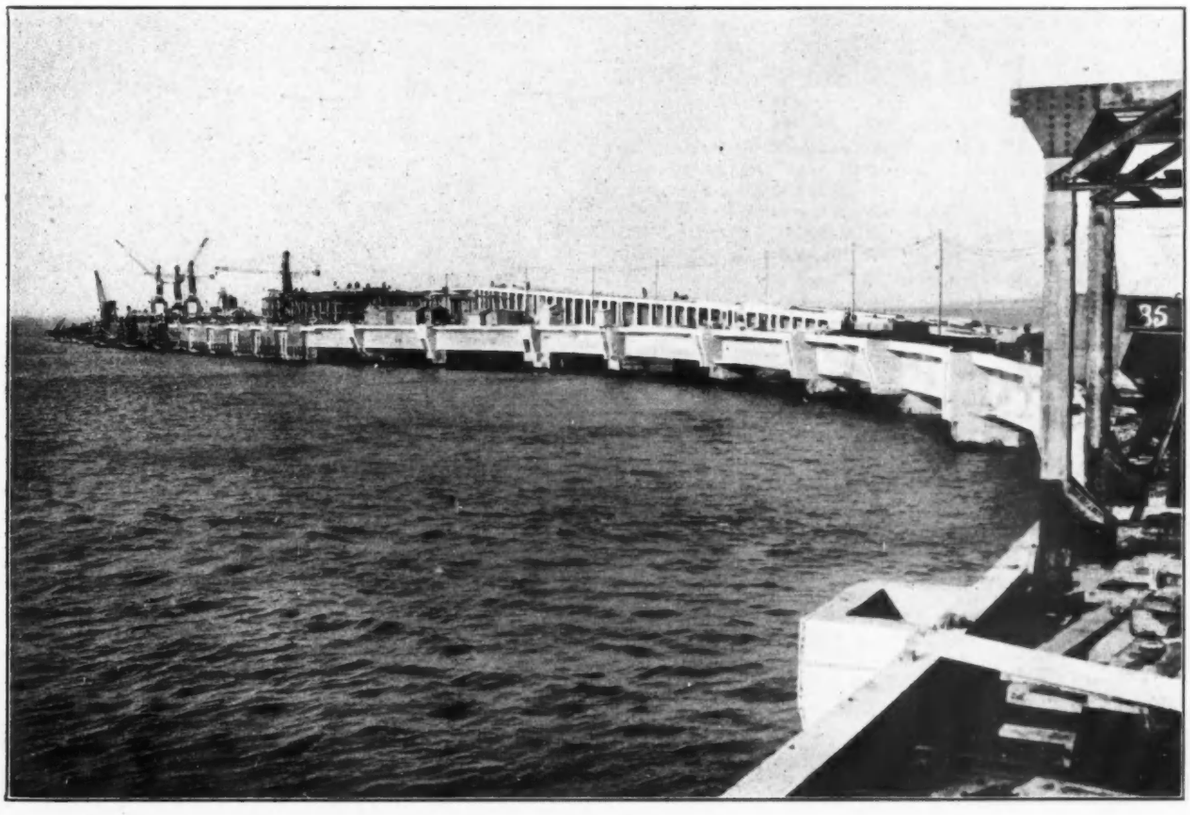


Plate W. General View of the Breakwater and the Approach Incline to the future Maritime Station.

The Harbour Pier of Verdon—continued

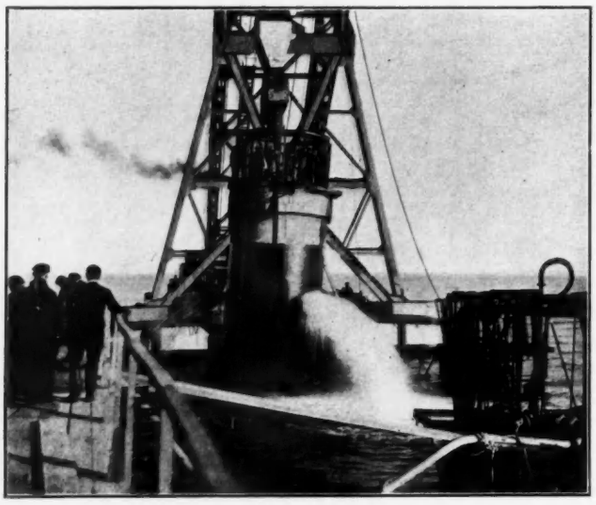


Plate J. Sinking

soil were thus arranged at 120 degrees on a circumference of about 1.70 m. radius; they were thus at more than two metres from the cutter. It was then thought that by arranging them nearer the latter the descent might be made easier, and therefore it was decided that for the first piles of 26.50 m. the emulser tubes should be fixed along the outer wall, as is seen in Plate H; their centres were no more than 1.30 m. distant from the cutter. Unfortunately, this outward position exposed the tubes to shocks and to wear and tear which might produce stoppages in the sinking. Several attempts were made on the first piles equipped both with six " external " emulser tubes and with three " internal " tubes; these, however, showed no result more favourable than the earlier ones.

Finally, it was decided to adopt the internal tubes, each acting individually, that is to say, six tubes arranged hexagonally (Plate K); in point of fact, however, the great majority of the sinkings have been completed with only three of these tubes, the other three playing only the rôle of spares, so that in certain urgent emergencies it was possible to launch and sink with a simple equipment of three emulsers and without any mishap in the operation.

The use of six emulsers (involving a certain loss of time for the equipment and also for the final dismantling) is none the less to be recommended from the point of view of ensuring a better distribution of the zones of operation, of regulating the descent and guarding against any failure in the functioning of any of these organs.

Housing in the Foundation Soil.

A further problem which required special attention was that of the embedding. We have already pointed out that the cutting by emulsion, easy and rapid as it is in loose soil, became impossible in a compact soil; this is the case with the stoney clay on which the work has to be carried out. Hence, in order to reach an absolute certainty of resistance and of homogeneity in the foundation soil, instructions were issued to embed the cutter of 0.50 m. in the compact clay. But it was easy to foresee that an emulsion, however prolonged, would prove to be rather ineffective. The use of compressed air had, on the other hand, to be abandoned at any cost for reasons already indicated. The problem was solved, therefore, by the carrying out of " depressions "; the hydrostatic pressure in the working chamber being determined by the water column within the pile, a depression of X metres in height in this column of s M^2 in section, produced the effect of an excess-charge X x (S-s) acting on the pile, S being the foundation section (a circle of 7.50 m. diameter). Thus it is that, with the pile of 21.50 m., having a chimney of 1.10 m. diameter, a depression of one metre was equivalent to an excess charge of 43 tons. The new piles not being equipped with chimneys, the depression acts over the whole of the inner section of 3.70 m. diameter and the effect of the excess charge is reduced to 33 tons per metre. It is therefore necessary to push the depression much further, and, even at the expense of certain complications, namely, the closuring of all the apertures in the wall of the pile (holes for the suspension axle, holes for the inlet of water into the working chamber). It should further be added that depressions reaching as high as 6 and 7 m. should not be undertaken except with precaution, in order to avoid any violent stress imperilling an inclination in the pile, a stress, however, which is the less to be dreaded, as the sinking is done in the natural soil.

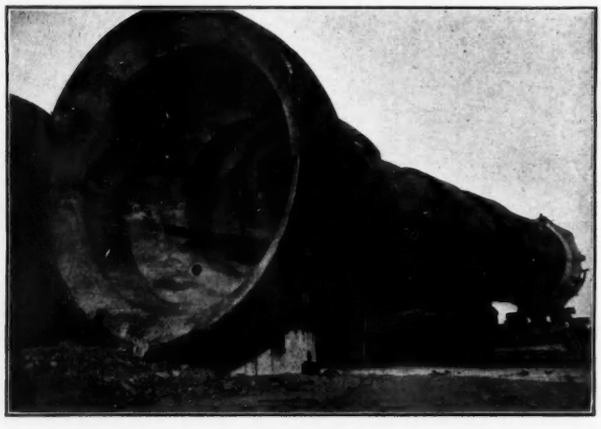


Plate K. Bell of a 26.50 metre Pile with emulser tubes.

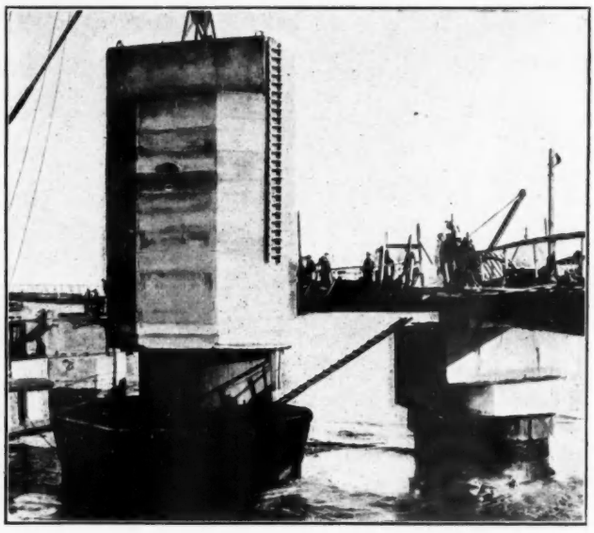


Plate N. Concrete Coffer-dams surmounting the Viaduct Piles.

D. Progress of the Operations: Superstructure

When the piles are put in position and sunk to their foundation depth the next problem is to charge them with concrete and thereafter to erect on them the reinforced concrete platform for further operations. The organisation of the work connected with the superstructure has presented all the difficulties inseparable from a narrow platform which has to be advanced gradually. The employment of a floating concrete platform merited attention from its easy manipulation, but it had one fatal drawback, as it was dependent on the ocean and all its risks. A system of telpher supplying was badly adapted to the perpetual motion of the platform and the distribution of the operations over a great length. Thus finally the only course open was to have the platform supplied by a railway from end to end with all the inconveniences arising from its narrow width; this was remedied by multiplying the railways and in doubling them when possible, and by pushing the concrete-mixers as far forward as possible on the sections already completed.

In principle the platform includes: in the head light and low gangways for the filling of the piles—to the rear, more substantial gangways, raised above the level of the working floor and equipped with movable cranes for the erection of the superstructure (Fig. 12 and Plate M). The former rest on the heads of the piles already sunk into position. After unbolting at the diver and the extraction of the emulser tubes within the pile it is possible first to fill the bell with submerged concrete, this being done by means of small and light cranes operating the skips of about 0.350 cubic metres and opening automatically at the foundation of the pile. An advantage of this filling is the fact that the cylinder of the pile may then be drained and the filling completed dry up to the head by direct discharge from the concrete carriages.

These light gangways, connected with the last high gangway by a stairway and a concrete channel, are movable and easily transported and adapt themselves to very convenient branchings of all the piles already launched (Plates L and M). This system has further been rendered far more practical by the adoption of a set of capitals capping the piles.

The Harbour Pier of Verdon—continued

Capitals.

The idea of these was suggested by the former piles when the impossibility of rendering certain coffer-dams (dislocated by the storms) watertight, rendered it necessary to seek another solution which would allow of dry working inside the pile. Thus there was evolved capitals which could act as dams and which were reinforced concrete pieces of a form generally cylindrical, fortified at their bases by small cylindrical tubes which can fit into the head of the pile (even when the latter was under water) and at their upper part by two projections intended to serve as supporting surfaces for the girder-work necessary to construct the superstructure (Plate N).

The employment of these capitals was then adopted in the 26.50 m. piles of the viaduct (Plate N shows both types of dams for piles of 21.50 m. and of 26.50 m.), and thereafter to the piles of the pier, the girder-work of which had to be embedded at the level (+4.00) reached by all the high tides except in dead water. An attempt made with metal boxings had to be speedily abandoned, for they could not be removed except with considerable difficulties and with too serious delays, while at the same time the tightness required for the completion of a satisfactory concrete would have been too imperfectly safeguarded.

Resort was then made to reinforced concrete capitals capable of resting easily on a pile after sinking and having later to serve the gusset moulds connecting the superstructure with the piles. Between pile and capital there is only a narrow annular space which it is easy to caulk rapidly with hemp and wood or to stop up subsequently with a filling of cement, whereby an excellent tightness is secured. Finally, these capitals have projections on which may rest the Grey ironwork supporting the whole capping platform of the superstructure (Plate O).

In order to obtain, in spite of the constantly varying foundation depths of the piles, between —20.00 and —23.00, the precision required in the depth of the superstructure, the capitals are constructed " to order " for each pile, and for this purpose are made of ground cement so as to avoid delays. Constructed to the rear of the platform on the completed section of the work, these elements, which weigh from 50 to 60 tons, are transported by a floating crane to a pile, as soon as possible after its sinking (Plate P); all the subsequent operations may then be carried out by a series of manipulations reduced to a minimum.

Joists and Wallings.

On the projections of the capitals rests the Grey ironwork of 75 cm. in height, and on this is erected the coffering platform (Fig. 12 and Plate Q). The ironwork and the coffering of the joists are then easily carried out. The different manipulations are done by means of 3 portico cranes which travel on the upper gangway and can carry from 2 to 4 tons according to the span, which varies from 10 to 20 m. (Plates S. and T).

The cofferings are of metal, which allows of an easy execution of the fillets and other complicated forms and also ensures an amount of vibration which will guarantee that the concrete will penetrate satisfactorily into the very dense ironwork (Plate T).

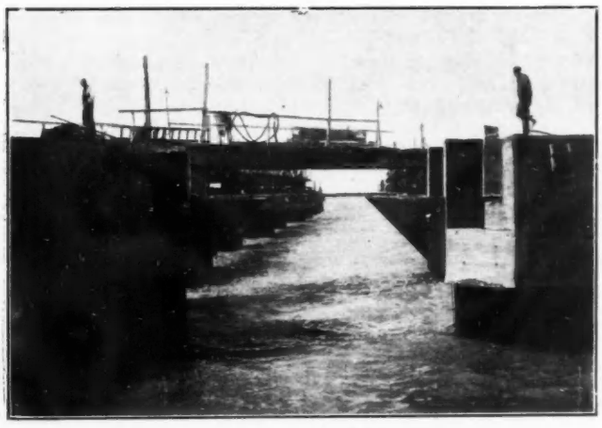


Plate O. Concrete Caps and Alignment of Piles.

It is to be observed that the iron supports of the coffering are calculated to carry only a little more than half the height of the 3.35 m. joists. The concreting is then done in two stages, this being further unavoidable owing to the masses incorporated in the work and for the purpose of regulating the loads. The lower half of the joists, reinforced for this purpose towards their upper parts by a few supplementary bars at the approaches of the housing, then serves to carry the upper part and the walling when they are concreted 15 days later.

The concrete is made from high furnace cement, the mixture being 400 kg. per square metre. The selection of this material, which is supplied by Germany as the result of estimates (though the French factories have also been producing it for several years) was dictated by its excellent adaptability to the sea, as also its high resisting power.

The sands and gravels are products from dredgings in the Gironde. When sifted and classified under the supervision of the Port Autonome, which has undertaken granulometric experiments, they are utilised through the intermediary of pans provided with automatic measuring gauges, in the granulometric proportions which will ensure the utmost compactness in the concrete.

Plate P. Positioning of a Concrete Cap on the Head of a Pile.

Lastly, the steel employed is a steel of special quality, having a 45 kg. rupture resistance, an elasticity limit of 30 kg. and 22 per cent. elongation. It was decided to make use of a copper steel, the percentage of the latter being 0.25 to 0.40 per cent., which, according to the tests carried on for several years in different countries, and more particularly in Germany and in England, would appear to provide a better guarantee of preservation from the sea. In point of fact, the process is still imperfectly known and even criticised adversely by certain experts, but it appears that these steels, though rusting superficially as rapidly as others, yet stand better subsequently, because the primary protector layer seems to have a more compact texture and renders the penetration of the rust inwards more difficult.

By way of concluding this sketch of the superstructure operations it may be added that they have been carried out in two stages. When the work had to be constructed on three sets of piles, the first stage was to construct the platform over a width of two rows, this having the double advantage of more rapidly completing a section of the work eventually accessible and of clearing the platform. Whenever one or two bays had been concreted the corresponding service gangways were lifted by a floating crane, and also the metal pylons supporting them. Both of these were then transferred to the head of the platform, thus allowing of a new step forward (Plates R and S).

As soon as this section of the work was sufficiently far advanced a beginning was made, from behind, to widen the platform landing as far as the third row of piles, and the platform thus enlarged could then be accelerated very quickly.

Special Construction Features.

From the operations carried out attention has had to be given to certain details, which it would occupy too long to describe minutely, but which may be noticed in passing.

The first of these is the system of clearing devices and shock absorbers elaborated by the engineers of the Administration and more particularly by M. Peltier. The purpose of this was to absorb with a shock which would injure neither a packet boat nor the work itself, the impact of a vessel of 60,000 tons which, driving sideways under the stress of the wind, would strike with a speed of 0.30 m. per second. A motion of this nature implies a kinetic energy force which is no longer on the scale of the Ducs d'Albe, the wooden defences or the mattresses so far provided in harbour works. The employment at Verdon of an oil-pneumatic absorber will prove a very interesting experiment which, without doubt, will be capable of generalisation. Plate V shows the massive buffering devices during the days when the pendulum absorber was being suspended.

A second distinctive feature of the breakwater arises from the idea entertained by the engineers of providing at present for the possibility of an extension of the work which must subsequently prove to be necessary. An extension in length will be easily carried out by the construction of new bays. In order to make the extension possible without serious complications there have been retained in the transverse bracings of the structure and on the land side supplementary bars in suffi-

The Harbour Pier of Verdon—*continued*

cient numbers and of an adequate length to be joined up to a new joist and having the necessary length of covering; these bars are at present bent down below the surface of the concrete (Fig. 13) and, when the necessity arises, it will suffice to remove the facing and to straighten the bars horizontally in order to start, in a very simple manner, the ironwork joining up with a new section of the breakwater.

Additional Operations.

The approach viaduct will include two iron ways and a carriage way of 5.75 m. width. The former, at the approach of the breakwater, expand into four ways, two outer ones running side by side with the tracks of the cranes which will discharge and embark and two inner ways for passenger traffic. The whole width of the breakwater will thus be devoted to traffic routes.

In addition, a highly modern maritime station having Customs offices, waiting-rooms, etc., and flanked by an open longitudinal gallery from which debarkations will take place will be devoted to the service of passengers, who will be able either to reach the carriages at the same level or to utilise the roadway. The necessity of providing these made it requisite to erect an approach incline by which the viaduct way should be raised to the height of the first landing, thus converting the iron way and outlet into a passage in which will be carried out all the movements of vehicles in front of the maritime station and on the same level therewith.

From the approach viaduct the iron ways will extend towards a sorting station erected on the land at the edge of the dam of la Croisette and thereafter they will join up with the station of Verdon and Bordeaux railway line.

As for the roadway, it will proceed directly to the village of Verdon and the national highway, which important extension operations and up-to-date improvements have, in the course of the last two years, rendered specially easy and speedy as far as Bordeaux.

E. Motive Power and Equipment

Space is too limited to allow of entering into the details of the complete organisation of the yard, of the working equipment or the material which have been found necessary for the successful accomplishment of these undertakings. From the photographs, however, it will be possible to observe the service of a large fleet comprising four floating cranes of 30 to 300 tons, four tugs of 300 to 500 h.p., and a large number of barges, pontoons and watch towers; the large number of cranes and derricks has also been noted.

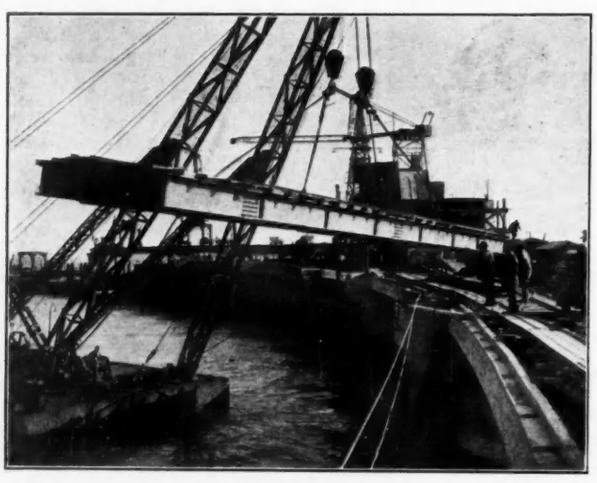


Plate R. Transport of a Gangway from the Rear to the Front of the Platform.

We shall simply mention in conclusion the motive power installations, which comprise four Diesel motors of 128 h.p. and which are supplemented by a current supply taken from the local section. In order to meet the requirements in motive power, in lighting and in feeding the compressors, the yard had thus at its disposal more than 650 h.p., which enabled it to meet all accidents and the instantaneous stoppages of motors, which are practically inevitable on a yard of these dimensions.

A few figures will suffice to give more definite ideas of the magnitude of the undertaking.

For the preparation of a pile on land there are required 40 tons of steel and its filling, after being sunk, absorbs more than 350 cubic metres of concrete.

Exclusive of the maritime station, there have been required in all more than 11,000 cubic metres of aluminous cement concrete, more than 55,000 cubic metres of ordinary concrete, and approximately 10,000 tons of steel.

The number of workmen employed either by day or by night has ranged from 500 to 750, according to the season of the year.

F. Conclusion

The Verdon undertaking, carried out, as has been stated, by the Société Anonyme Hersent, in collaboration with the J. Berger Company, reflects the highest honour on the engineers and especially on M. Lévèque, Director of the Port Autonome, on M. Peltier, Engineer of Bridges and Roadways, and his collaborators, Messieurs Home, Serrano and Hargous, not forgetting Mons. Caquot, Consulting Engineer of the Harbour. It exemplifies a very interesting application of sinking by emulsion. Further, I cannot forebear to mention also two experts of first rank, both engineers of arts and manufactures and members of our Society, Messieurs Hébert and Sagne, the parts played by whom have been very important, the one in the theoretic study of the process and the other in its practical application in the yard.

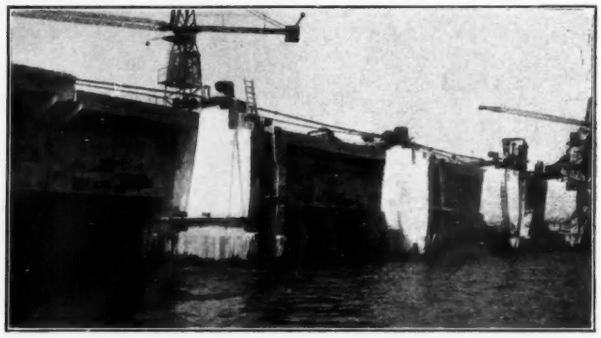


Plate V. Face of Breakwater with Buffering Devices.

After the first tentative efforts and the starting difficulties the undertaking has been carried out with a speed never attained up to the present day. As a matter of fact, certain piles were completely sunk within 7 to 9 hours after being taken from the hold. In citing this remarkable record, however, I must make haste to emphasise its exceptional character, for serious consequences might arise if a detailed estimate for a new undertaking were to be made out on the basis of such a performance.

Owing to its rapidity and its economy, the advantages of the process are certain so long as the soils passed through are homogeneous and capable of being disintegrated by the current caused by emulsion. There is a danger, however, of miscalculations and of delays which might endanger these advantages when the engineers must work through a soil containing blocks, slate or layers of heavy boulders, frequent wreckages and strata which resist cutting or even a soil having a considerable inclination to the horizontal. Moreover, these remarks take no account of the fact that the present process is only transitional and that it is quite possible that subsequent improvements (special cutting outfit and disintegration more uniformly distributed) will allow ultimately of these or certain of these difficulties being overcome and more particularly those relating to the passage through compact soils.

Southampton Docks' Statistics for November.

The November statistics of the Southern Railway for Southampton Docks showed that, compared with the corresponding month of last year, the number of vessels inward declined from 238 to 211, and outward from 237 to 207. The gross tonnage inward slumped from 1,068,727 tons to 830,064 tons, a decrease of 238,663 tons. Outward the total dropped from 1,044,671 tons to 894,715 tons, a fall of 149,956 tons. In the net tonnage the decrease inward was 124,360 tons and the decrease outward 75,851 tons.

Imported cargo dropped by 10,971 tons, the total being only 39,719 tons in comparison with 50,690 tons a year ago. Exports, however, showed a small increase from 27,984 tons to 28,639 tons.

Passenger traffic showed a drop both inward and outward. The former figure decreased from 5,851 to 5,358, and the outward from 7,422 to 7,071.

In trooping there was an increase inward of 2,726, and a decrease outward of 1,669, the totals being: inward 5,968 and outward 1,519.